International Society for the Study of Information (IS4SI) Summit 2019
UC Berkeley, June 2-6

Where is the I in AI and the meaning in information?

Keynote Speakers Include:
Terrence Deacon, Jaron Lanier, Anca Dragan, Melanie Mitchell, Paul Duguid, Paul Saffo, Francis Heylighen, Paul Verschure, Stefan Liejnen and more to come...

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Abstract Booklet

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How a Language-Focused Information Theory can Account for Musical Meaning

Abstract Topic: The "I" in AI, and the Meaning in Information

Author Name: Matthew Slayton

Abstract Description: The relationship between information and significance (or meaning) is frequently presumed to be explained by information theory, as originally conceived by Claude Shannon. Significance is considered either to be coextensive with information (e.g., as bits) or to be epiphenomenal. Terrence Deacon and others have argued that information is not a property of the medium, but a property of the relationship between thinking, perceiving individuals. The problem, then, is how to expand the concept of information so that it can include information that has significance to an individual. While I agree that a co-evolutionary, cognitive, symbolic niche construction model of information and significance is the next step toward a more complete information theory, this theory will not be complete until it can account for non-referential forms of signification as well, such as those in music. I will argue that part of the reason that music is not included in critiques of information theory are due to an historical over-reliance on language as a model system for information and significance. Language can presume a distinction between sign vehicle and object which music blurs. Compared with language, music and iconic forms of meaning transmit information in a way that's difficult to pin down, which is why it poses a natural challenge for reductive information theory. I will explore the co-evolutionary history of language and music, theories of iconicity that are relevant to the critique of information, and an analysis of mutual information, the conventional approach for dealing with iconicity in information theory. By recontextualizing probabilistic, reductive concepts of information within a critique of the critique of information without significance, this talk will demonstrate that until information theory can adequately account for musical meaning and non-representational significance, it will remain incomplete.
Spatialization of time from the perspective of Information philosophy

Abstract Description: The cognition of spatial orientation is the basis of perception of the objective world. Human are accustomed to relying on space to describe time. The spatialization mechanism of time is one of the important ways to explore the essence of time. People are used to mapping abstract, unfamiliar time categories and relationships to specific, familiar spatial categories and relationships, which lead to the theories of “metaphor and metonymy” as the ways of spatialization of time concept in cognitive linguistics. However, from the perspective of information philosophy, the above research only stays at the level of regenerative temporal and spatial information(concept), and does not trace back to the source of objective ontology to explain the spatialization process of time. According to the ontology theory of Information Philosophy, information can be divided into three different forms and the concept is just the third form of information. Thus, we can analyze the spatialization process of time under the objective time and space, in-itself, for-self and regenerative space-time information form, revealing the inevitability spatialization of human temporal cognitive. This informational perspective shows the ontological source of the human's perception of “past, present and future” and deepens the study of the essence of time.
A General Theory of Tech-induced Social Collapse and its Remedies

Abstract Description: For over a hundred years observers of society have lamented how technology damages human social interaction. From E.M Forster's 1909 short story “The Machine Stops” to the better known technologically-enhanced dystopias of Huxley, Orwell, and Bradbury to cultural critiques by McLuhan, Rushkoff, Dyson, Galloway, and Deacon, a coherent consensus has emerged: tech is bad for us. Now, that same truth is visible through the lens of theoretical physics. Using the mathematical laws which accurately predict how matter, energy, and information move through space and time to understand how technologically-mediated communication impacts human beings and human societies, I show why the widespread use of digital communications technology is leading us toward social collapse. These same mathematical laws make clear that human brains, like AI, need good training data to make accurate predictions. Unlike AI, human brains require unmediated sensorimotor training data that originates from three-dimensional environments and other human beings. Unmediated sensorimotor training data flows at higher bandwidth and with greater timing fidelity than mediated sensorimotor training data ever could (e.g., VR, online video, text). Stripped of the high-bandwidth validation channels native to unmediated training data, symbolic communication becomes low-bandwidth, corruptible, biased, de-calibrating, and untrustworthy. This protocol mismatch—between the high-bandwidth authenticity human nervous systems need and the slow and synthesized fakery symbols and mediated communication often provide—causes a progressive and accelerating collapse of social trust. When seen through a multiplicity of disciplinary lenses (e.g., thermodynamics, economics, neuroscience, computer science, information theory) such collapse proves to be a truly universal process. Fortunately, the laws of physics also suggest ways to make mediated communication safer for humans, and provide potent remedies for tech-induced psychosocial ills, especially through the auditory, kinaesthetic, and spinal systems. In particular, novel techniques like ultra-grounding and ultra-resonance may supercharge embodiment modalities like yoga, dance, massage, and acupuncture, promoting fast cheap cures to digital decalibration.
A kind of Pattern Recognition Machine Base on Polarized Vector of Inner Product and Spatial-Time Entanglement

Abstract Topic: The "I" in AI, and the Meaning in Information

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Company/Organization: Shanghai Maritime University

Author Name: Jingjuan Feng 2
Company/Organization: TRC Solutions, Inc

Abstract Description: Noetic science and natural science and social science are listed as three major sciences, and it studies the law of processing information. The question, proposed by Turing: "Can Machine Think?" not only involves the basic contradiction "Whether or not can the material change into the spirit?" in philosophy, but also a chain of secondary contradiction induced by it, such that the law of unity of opposites between an object u and its contradiction object v, the mechanism of mutual transformation between quality and quantity, and the rule of dialectical transformation, i.e. so-called "law of unity of opposites and dialectic transformation" have become the key problems that need to be addressed in Noetic Science, Intelligence Science and Theory of Meta Synthetic Wisdom. The distance d(u,v) between object u and its opposing object and its varying with time t are considered as the criterion for judging "whether two objects are different each other", and the control mechanism for the contradictory movement, change and development between two opposite objects, even the law of the dialectical transformation between them, respectively. Because distance is defined as the square root of the inner product between input vector and weight vector, but the inner product is an invariant, by which not only a polarization circle and a cluster of Polarization Vectors can be induced, but also a Polarized-Entangled vector and an Analytic Function with its conjugation can be accompanied by them. The Polarized Vector of Inner Product and Spatial-Time Entangled Vector is proposed and a kind of Pattern Recognition Machine, called a Attribute Grid Computer based on Qualitative Mapping is given in this paper.
A New Iteration Algorithm for the Maximum Mutual Information Classifications of Factor Spaces

**Abstract Description**: The factor space is also the feature space of instances or true classes. We use "factor" because observed factors instead of any property are used as features. In detections, estimations, and classifications, signal X is mixed with noise to become Z, or the factor Z of class X is observed. We need classifier Y=f(Z) to predict X by Y. Shannon and others use minimum average distortion instead of Maximum Mutual Information (MMI) as the optimization criterion because it is very hard to solve the MMI. Without f(Z), we cannot express mutual information I(X; Y). Without the expression, we cannot optimize f(Z). An expedient method is first to construct likelihood functions or Shannon's channels with parameters, and then to search the parameter space by the gradient descent or the Newton Method. According to the semantic information G theory, we can use a simple iteration algorithm to resolve this problem. The semantic information measure is \( I_{ij}=\log[T(\theta_j|x_i)/T(\theta_j)] \), where \( T(\theta_j|x_i) \) is a truth function, and \( T(\theta) \) is its average. The average \( G \) of \( I_{ij} \) is the Semantic Mutual Information (SMI). For given \( f(Z) \), there is information \( I_{ij}^*=\log[P(y_j|x_i)/P(y_j)] \). In this algorithm, Step I is to let \( I_{ij}=I_{ij}^* \), and Step II is to optimize \( f(Z) \) to maximize \( G \) by the KL formula. Our experiments show that 2-3 iterations can make \( I(X;Y) \) reach 99% of the MMI in most cases. The convergence can be proved with the R(G) function, which is an improved R(D) function. The R(G) function is a bowl-like curve with a matching point \( G=R \), which means \( R\geq G \) always. The Step I makes \( G=R \) and produces a new R(G) with a higher matching point. The Step II makes G climb to the upper right corner of the new R(G) function. Repeating the two steps can achieve the MMI. Reference: https://arxiv.org/abs/lu_c_3.html
A New Logical Paradigm of Intelligence Science

Abstract Description: Intelligence is the function of human brain thinking, and logic is the law of thinking. Traditionally, the logical paradigm of mathematics and computer are both rigid, based on standard logic. Then, the development of artificial intelligence has proved that in the intelligent science, relying solely on the rigid logic paradigm is not enough. Because the rigid logic paradigm can only solve the deterministic problem, which can be described as “either this or that”. But the research objects in the intelligent science usually have different degrees of uncertainty. Actually, there exist both ‘both this and that’ and ‘neither this nor that’. This requires the establishment of a flexible logic paradigm that can solve uncertainty reasoning. A flexible logic paradigm is based on mathematical dialectical logic, which means that it has a dialectical ability to deal with uncertainty problems. After nearly 30 years of exploration, we have established propositional mathematics dialectical logic. This article will introduce how we proceed from the mathematical formal logic, step by step to release the constraint of logical elements prescribe hard rules, and introduce the uncertainty parameter and its adjustment mechanism. Finally, a complete propositional mathematics dialectical logic (referred to as flexible propositional logic) is established. In particular, it proves that the flexible propositional logic and flexible neurons have a one-to-one correspondence, which is crucial to overcome the interpretable bottleneck of deep neural networks.
A Philosophical and Scientific Integrated Approach to AI Research

Abstract Topic: Global Forum on Artificial Intelligence (GFAI)

Author Name: Tianen Wang

Company/Organization: Shanghai University

Abstract Description: The approaches of symbolism, connectionism and actionism in the research of artificial intelligence all have important implications of knowledge theory, and have their respective status and functions in the research of AI. The key to the breakthrough of the core mechanism of artificial intelligence lies in the mechanism integration of three approaches. The mechanism-based approach of artificial intelligence has made an important research in this respect; this article tries to make further exploration in the perspective of integration of philosophy and science. The approach of symbolism is to establish formal relation system on the basis of prescription. Formal deduction is the basis for AI to establish relational system, but AI cannot really have the ability to understand only via formal deduction. An intelligent agent is a complex relation system. The connection in connectionism approach involves the mechanism of establishing internal relation, which is closely related to the evolution of internal structure in the process of intelligence evolution. The actionism approach involves a mechanism for establishing external relation and is closely related to the evolution of external structures in the evolution of intelligence. The integration of artificial intelligence research should be based on the formal deduction of symbolism, combined with the internal relations of connectionism and the external relations of actionism, and achieves intelligence evolution through firsthand experience in an intelligent agent community. Only in the evolution of an intelligent agent community, can the internal and external relations of an intelligent agent be formed.
A Problem Oriented Reconstruction Model of Multi-Resource Information Using Factor Space and Extenics

Abstract Description: There is a huge amount of data spread across the web and stored in databases that we can use to search information or acquire knowledge. However, exploiting this data to mine knowledge for problem solving intelligently is difficult due to the heterogeneity of the sources, scale of the amount of data, and noise in the data. The demand of problem solving by comprehensive knowledge mining rely on well-structured information and knowledge from multi-resources. Knowledge graphs record millions of entities and their relationships which are structure-flexible and content-rich, they are getting ready to use in problem solving after integrate with dynamic attribute values. The challenge lies in the gap between their overwhelming complexity in data and the limited factor knowledge and attribute values of non-professional users facing with problems. This problem has led to an increased emphasis on solutions to integration of multi-granularity and cross-domain information and knowledge graphs. To provide the service of problem solving intelligently by the Web, the key factor is the reconstruction of web information into problem oriented. We propose to build a novel hybrid method of basic element-factor space model which extracting the objects, attributes, and values from the mass information of internet with simulation and automatically building the field basic elements on multi-resource information based on Factor space theory and Extenics. Moreover, we put forward an intelligent algorithm which collects correlative factors of special problem from the multi-resource information for acquiring domain knowledge, then integrate with dynamic basic-element, experiences knowledge of experts and factors. It provides theoretical basis and new methods about using the internet to generate the innovative strategy of problem solving and explore a new generation of problem-solving oriented knowledge search engine. Keywords: Factor Space; Extenics; Information Reconstruction Model; Knowledge Mining
A Semantic Information Measure Connecting Shannon's Information Theory and Machine Learning

Abstract Topic: The "I" in AI, and the Meaning in Information

Author Name: Chenguang Lu * 1

Company/Organization: Liaoning Engineering and Technology University

Abstract Description: Without using truth functions and likelihood functions, Shannon's Information theory cannot measure Semantic Information (SI) or deal with hypothesis-testing for Machine Learning (ML). We need to optimize ML by Popper's information criterion, which means that a hypothesis with less logical probability can convey more information if it can survive empirical tests. We improve Carnap and Barhillel's SI formula \( I_j = \log[1/T(y_j)] \), where \( T(y_j) \) is the logical probability of hypothesis \( y_j \), by \( I_{ij} = \log[\frac{T(y_j|\theta_i)}{T(y_j)}] = \log[\frac{P(x_i|\theta_j)}{P(x_i)}] \), where \( T(y_j|\theta_i) \) is the fuzzy truth value of proposition \( y_j(x_i) \), \( T(y_j) \) is its average, and \( P(x_i|\theta_j) \) is the likelihood function. This measure \( I_{ij} \) accords with Popper' thought. To average \( I_{ij} \), we obtain a Generalized Kullback-Leibker Formula (GKLF) and a Semantic Mutual Information (SMI) formula. With the GKLF, we can use sampling distributions to optimize truth functions or likelihood functions. This step is called Matching I, meaning the semantic channel matches the Shannon channel. For given truth functions or likelihood functions, we can use the Maximum Mutual Information (MMI) criterion for classifications. This step is called Matching II, meaning the Shannon channel maches the semantic channel. For the multi-label MMI classifications of visible instances, we need Matching I and II one time. For the MMI classifications of unseen instances, we need repeating Matching I and II. For mixture models, Matching II is to minimize Shannon's MI minus the SMI so that the EM algorithm becomes the CM-EM algorithm. We have used some examples to test these algorithms. The results are inspiring. The MMI classifications of unseen instances only need 2-3 iterations generally. The CM-EM algorithm for mixture models only needs 4-10 iterations generally. Above studies reveal that the meaning of semantic information lies in more accurate and precise predictions; "I" in AI mainly includes the our ability of optimizing semantic communication. References: https://arxiv.org/abs/1809.01577
A Stranger in a Strange Land: AI and the Proper Definition of Knowledge

Abstract Description: In his 2002 essay for the Cambridge Companion to Gadamer, Charles Taylor mused, "The great challenge of the coming century, both for politics and for social science, is that of understanding the other" (Taylor, 126). Nearly two decades later we are challenged by a new other – the technological other of Artificial Intelligences. At the root, the questions and hurdles pressed by both the human 'other' and the technological 'other' are intertwined, involving all the same re-evaluations of consciousness, language, self-identity, emotion, meaning, and ultimately knowledge itself. No recent philosopher has spent more time dealing with these very inquiries than Hans-Georg Gadamer, and it is on his thought this essay will focus. Gadamer's work stands alongside three or four others as a pillar of contemporary philosophical discourse, and his particular focus on aesthetics, language, and interpretation provides a vast resource for technical AI researchers and practitioners seeking to describe and advance both the inner workings of artificial minds and the relationships we might have with them. This essay will critically engage with Gadamer's unique definition of knowledge primarily via his short papers “The Relevance of the Beautiful” (1986) and “Language and Understanding” (1970). I will suggest how Gadamer's pioneering work on the phenomenology of language, embodied cognition, and philosophical hermeneutics can provide a framework for understanding the AI 'other'. Exploring Gadamer's insights will further our ability to describe the interrelation of experience and knowledge and provide a path towards a more holistic model of human and artificial intelligence.
A Systematic Review of Security Ontologies from the Perspective of Knowledge Representation

Abstract Description: Since the birth of artificial intelligence, the application of its methods and technologies has gradually penetrated into many fields, such as information security. With the development of information technology, the importance of information system security is also increasing. The security operation and maintenance of information systems requires a lot of work, so the use of artificial intelligence methods to enable machines to solve problems in the field of information security is inevitably an option. In recent years, information security has become an important area of artificial intelligence applications. Mostly it is necessary to judge the security status of systems according to security standards. However, these security standards are basically written in natural languages at the semantic level. Therefore security ontologies are developed by researchers to clearly express concepts and their relations in the information security domain. With these efforts researchers aim to share domain knowledge and to introduce the logical strictness of problem solving in their work. In this paper the existing main security ontologies are summarized, classified and compared from the perspective of knowledge representation, according to their concept classification, the complexity of the relationship between concepts, the purpose of knowledge representation, and the process of knowledge application. As a result of the analysis, we propose an ontology-based problem-solving framework in information security domain. Future research directions of knowledge representation in information security domain are also suggested.
A Taxonomy of the Neural Network Zoo

Abstract Description: The past decade has witnessed a spectacular revival of academic and commercial interest in deep learning. Numerous applications of artificial intelligence in general and neural networks model in particular, have led to a variety of network types and topologies. The Asimov Institute has recently published an update of the Neural Network Zoo, an overview of the most commonly used models in deep learning. Whereas some models are engineered to provide optimal learning of a particular task, others trade performance for universality by staying close to their biological inspiration. Upon further inspection, this taxonomy lays out several dimensions of depth, and points to a more general dynamics that could underly networked information processing systems.
A Universal Theory of Artificial Intelligence based on Mechanism Approach

Abstract Topic: General Submissions

Author Name: Yixin Zhong

Company/Organization: Beijing University of Posts and Telecommunications

Abstract Description: There have been three theories of Artificial Intelligence (AI) existed till the present, i.e., artificial neural networks, expert systems, and sensor-motor systems. Each of them has made progresses during the past decades. On the other hand, however, due to the employment of the mechanical reductionism methodology featured with "divide and conquer", they are adifferent kind of local theory of AI, belonging to the structuralism AI, functionalism AI, and behaviorism AI, none of them can play the role as a universal theory of AI. This is the greatest challenge to AI theory. Many researchers have made tremendous efforts in seeking the universal theory of AI, N. Nilsson, S. Russell and P. Norvig are paet of them. This paper will present a universal theory of AI based on the mechanism approach, the latter of which is a group of complex conversions from information to knowledge and then to intelligence. It will be shown in the paper that the three theories mentioned above, the Structuralism AI, the Functionalism AI, and the Behaviorism AI, are the harmonious cases of the Mechanism AI. Furthermore, the Mechanism AI has also been able to unify the theories of primary consciousness, emotion, and intellect, the most meaningful part of universal theory of AI. Also interestingly, the questions of "where is the I in AI and where is the meaning in information" can precisely be answered from the universal theory of AI.
ABOUT NATURAL ORIGIN OF INFORMATION AND NATURAL ENCODING INFORMATION

Abstract Topic: Foundations of Information Science (FIS)

Author Name: Vladimir Lerner 1 *
Company/Organization: retired

Abstract Description: How to artificially encode observer in universal information coding structure like DNA? It requires naturally creating information Bits and natural encoding triplet code enables recognizing other encoded information. These Bits becomes standard units of different information languages in modern communications. Fundamental interactions build structure of Universe. Numerous multilevel inter-species interactions selforganize biosystems. Human interactions unify these and many others. Physical reality is only interactions identified or not yet. Each inter-action is elementary yes-no action of impulse which models a natural Bit. Natural interactive process, transferring Bits, models information process. Information is universal physical substance a phenomenon of interaction which not only originates information but transfers it sequentially. Mutually interacting processes enable creating new elements like that in chemical chain reactions. The elements, enclosing components of reaction, memorize the interactive yes-no result similar to encoding. The energy quantity and quality of specific interaction determine the sequence of transferring information, its encoding, and limit the code length. The introduced formalism of both natural emergence information and its encoding also shows advantage over non-natural encoding. The impulse sequential natural encoding merges memory with the time of memorizing information and compensates the cost by running time intervals of encoding. Information process binds the encoding impulse reversible microprocesses in multiple impulses macroprocess of information irreversible dynamics. The encoding process integrates geometrical triplet coding structure rotating double helix of sequencing cells Bits. The results validate computer simulation, experiments in coding genetic information, experimental encoding by spiking neurons, others.
ABOUT NATURAL ORIGIN OF INFORMATION AND NATURAL ENCODING INFORMATION

Abstract Topic: Theoretical Information Studies (TIS)

Author Name: Vladimir Lerner

Company/Organization: retired

Abstract Description: How to artificially encode Observer in universal information coding structure like DNA? It requires both natural creating information Bits and natural encoding them in common triplet code. That code enables recognizing other encoded natural information in different Information Observers. These Bits are standard units of information for building different information languages in multiple communications of the information Observers. Fundamental interactions build the structure of Universe. Numerous multilevel interspecies interactions selforganize biosystems. Human interactions unify these and many others. Physical reality is only interactions identified or not yet. Each inter-action describes elementary yes-no action of impulse which models a Bit. Natural interactive process transferring Bits models information process. Information is universal physical substance a phenomenon of interaction, which not only originates information but transfers it sequentially. Multiple natural processes, mutually interacting, enable creating new elements like that in chemical chain reactions. The elements encloses components of the reaction memorizing the interactive yes-no result similar to encoding. The energy quantity and quality of specific interaction evaluated by the level of its order-disorder or symmetry-asymmetry determine sequence of transferring information, its encoding, and limit the code length. The introduced information formalism of both natural emergence information and its encoding also shows their advantage over non-natural encoding. The impulse sequential natural encoding merges memory with the time of memorizing information and compensates the cost by running time intervals of encoding. The information process binds the encoding impulse reversible microprocesses in multiple impulses macroprocess of information irreversible dynamics. The encoding process integrates geometrical triplets coding structure rotating a helix of the sequencing cells Bits. The results validate computer simulation, multiple experiments in coding genetic information, experimental encoding by spiking neurons, others. Lerner V.S. How Information creates its Observer. The Emergence of the Information Observer with Regularities, Nova Science, 2019.
Adapting Under the Influence of Symbols

Abstract Topic: General Submissions

Author Name: Jeremy Sherman

Abstract Description: For 3.8 billion years, life has been adapting to reality. Today, humans do so under the influence of symbols, language and all that follows from it. While there have been many explorations of the origins of language, evolution, and nature of symbols and language very little attention has been paid to surveying and inventorying the variety of ways that it changes the adaptive process, making humans both more visionairy and more delusional, more precisely connected and more imprecisely disconnected than other species. This presentation will provide a first-pass survey/inventory of the differences symbols make and will speculate on the implications for extraterrestrial intelligent (symbolic) life. It will also identify ways that considering symbolic processes as fundamental within information theory distorts our understanding of the emergence and nature of info-semiotics.
AI as a non-embodied and externally programmed intelligence: About the question of reproducing human intelligence by a machine.

Abstract Topic: Habits and Rituals (H&R)

Author Name: Guido Seddone

Company/Organization: University of Parma, Italy

Abstract Description: In this talk I will previously address the question concerning the difference between natural intelligence (NI) and artificial intelligence (AI) by stressing the fact that the latter exists by virtue of external programming by some independent intelligence whereas the former is the result of autonomous learning. I will furthermore provide an insight of how this autonomous learning works and highlight that the autonomous character of NI is the outcome of the biological requisites of the brain and the living body. NI is a faculty connected to the natural disposition to enact norms and principles of thinking and behaving and elaborate information for the biological homeostasis of the organism. In this context the characteristics of AI as a non-natural faculty externally programmed are quite rigid in terms of adaptivity, autonomous learning and autonomous acting. Nonetheless, new generations of AI could supply us with more advanced functions and skills copying and replying the functions of NI and biological systems. In order to understand the complexity of NI and the difficult of having autonomous AI we have to tackle the question concerning the embodiment of cognition and the relation between life and mind. In this contribution I will explain natural mind as an evolved biological faculty strictly connected to feelings and enabling human beings of having self-conscious life and autonomous agency on the basis of the specific relation they establish with similar human beings. The strict interdependence of mind, feelings and socialization arises many doubts concerning the possibility of having autonomously learning machines unless we are able to reproduce the same biological features and tissues of humans. This would also challenge the idea that cognition and thinking are plain computational faculties.
**Algorithm Ruling Information Transfer in Genetics Found**

**Abstract Topic**: Foundations of Information Science (FIS)

**Author Name**: Karl Javorszky

**Abstract Description**: The arithmetic behind why triplets and why four variants of logical markers are used by Nature to translate arrangements across the number of dimensions has been found. The DNA is a linear sequence, which points out properties of an assembly that is more than three dimensional. The logical arrows that point out one specific linear arrangement of logical markers to be equivalent to one specific step in the assembly of a multidimensional assembly, the living organism, have been found to be connected, naturally, to procedures of re-sequencing. Our counting system is based on the principle of using similar, equivalent, identically formed units. A change of perspectives is needed to see, how assemblies made up of differing objects show similarities in their movement patterns as the sequence the objects are presently in, gets re-ordered into a different sequence. The key word is “cycles”: that is, the group of elements that move together during a reorder, connecting elements, their places and properties with an inner, linear sequence of the succession the members of the corpus of the cycle follow each other. The sequence Nature uses to transmit information turns up after some sequencing and re-sequencing as the basic structure of space. The message refers to which of the axes' combination is relevant in the twice 3 planes that constitute space. The axes are readings of the values of the logical sentence a+b=c. Which molecule (amino acid) will attach when depends on the characteristics of space: that is, the characteristics of the planes that constitute space. Molecular geometry will establish, how a comprehensive description logical archetypes allows recognising, which aspects result in matching with, answering to, fitting in of the molecules onto a plane of which the axes are, say, (a+b,a;2b-a,a) as opposed to, say, (a+b;b;2b-a,2a-b).
All geared up with gadgets: Did Apple just hijacked the Cartesian "i"

Abstract Topic: The "I" in AI, and the Meaning in Information

Author Name: Shima Beigi 1 *
Company/Organization: Mindfulness Engineering™

Abstract Description: Suffices to look around and find at least one person in our vicinity that is pulled into their smart devices and the reality that is created by the information, communication and technology (ICT) platforms. When we are offered this multiple coexistence of realities, to what extent should or can we exercise our freedom to opt out from the realities that are undesirable? The increasing interconnectivity of today's world is calling us to re-engage with the world with a different level of awareness, with a more mature mindset, able to stay present with our collective pains, traumas and difficulties. The "I" before the Internet, could think and conclude that "it exists", referring to "I think, therefore I am". But, what about the "I" after the internet? Is Siri replacing the "I"? We can only unlock the vast potential of the AI and technological industry for human progress if we discuss their either sides, the bright, not so bright side. We can only design "for" and "with" humans, if we investigate ways in which technology is affecting our human relations, social norms and behaviours. Granted, in this presentation, the author drawing on both Western philosophies and Eastern traditions provides a case for the "I" in the this digital age.
An Exposition of the Quantum Theory of Language

Abstract Description: A presentation on the statistical linguistic techniques utilized by Prof. Sheldon Klein, who was awarded the first doctorate in computational linguistics by California-Berkeley for co-creating semantic networks with Robert Simmons. Klein was helping provide the statistical expertise for this staple of NLP, created at SDC for the USAF. Due to military classifications surrounding parts of his work, the fact that the statistics of Gustav Herdan was being implemented in his models, was never published by Klein. The only link between them, are the academic reviews of Herdan by Douglas Chretien. A founder of the Linguistics department at California and the doctoral advisor to Klein. The crux of Herdan's method for computing the norm of vocabulary, combines the characteristic (K) of Udny Yule with the use of random partitioning. Use of Yule's characteristic is necessitated, as more traditional statistical metrics vary with sample size. Knowledge of K, as the correct formulization of the repeat rate of vocabulary items allows for the establishment of the following inequality, Antilog (-H) < * K. The derivation of K by Herdan being the dual to the Characteristic first published by Alan Turing's comrade in arms, I. J. Good, in his seminal paper on the Good-Turing Frequency Estimation. The inequality standing in relation to the uncertainty principle of physics. The further development of Yule's literary statistics by Herdan, extending Yule's random partitioning function to unequal sample size, brought in the use of the occupancy statistics of quantum mechanics for entropic calculations, while lowering the encoding of the bits per word. Completing Herdan's argument for replacing the concept of information on the word level by Plank's black body radiation.
An Exposition of the Quantum Theory of Language

Abstract Description: A presentation on the statistical linguistic techniques utilized by Prof. Sheldon Klein, who was awarded the first doctorate in computational linguistics by California-Berkeley for co-creating semantic networks with Robert Simmons. Klein was helping provide the statistical expertise for this staple of NLP, created at SDC for the USAF. Due to military classifications surrounding parts of his work, the fact that the statistics of Gustav Herdan was being implemented in his models, was never published by Klein. The only link between them, are the academic reviews of Herdan by Douglas Chretien. A founder of the Linguistics department at California and the doctoral advisor to Klein. The crux of Herdan's method for computing the norm of vocabulary, combines the characteristic (K) of Udny Yule with the use of random partitioning. Use of Yule's characteristic is necessitated, as more traditional statistical metrics vary with sample size. Knowledge of K, as the correct formulization of the repeat rate of vocabulary items allows for the establishment of the following inequality, Antilog (-H) < = K. The derivation of K by Herdan being the dual to the Characteristic first published by Alan Turing's comrade in arms, I. J. Good, in his seminal paper on the Good-Turing Frequency Estimation. The inequality standing in relation to the uncertainty principle of physics. The further development of Yule's literary statistics by Herdan, extending Yule's random partitioning function to unequal sample size, brought in the use of the occupancy statistics of quantum mechanics for entropic calculations, while lowering the encoding of the bits per word. Completing Herdan's argument for replacing the concept of information on the word level by Plank's black body radiation.
An intelligent model with chaos

Abstract Topic: Global Forum on Artificial Intelligence (GFAI)

Abstract Description: The current machine learning method has the disadvantages of relying on data and statistics, and the model is uninterpretable. So, we propose a model based on chaos. The model reconstructs the original system equivalently and explores the causality so that it can achieve accurate prediction of complex systems without statistics. At the same time, causality can explain the model. By analyzing the properties of chaos, such model is sensitive and adaptable to the change of conditions, and its learning process is more like humans'. This method works well and makes precise predictions in two complex nonlinear systems. We think this model may provide a new idea for current research.
Abstract ID: IS45187165

**An Optimization-Based Theory of Mind for Human-Robot Interaction**

**Abstract Topic:**

**Author Name:** Anca Dragan 1 *

**Company/Organization:** UC Berkeley

**Abstract Description:** Generating robot action for interaction with people is not scalable without learning, but learning from scratch has too high sample complexity. Inductive bias becomes critical, but what is the right inductive bias when it comes to people? We study a core assumption: that people are driven by intentions and are approximately rational in pursuing them. We derive algorithms that can leverage this assumption, ways in which we can bring the assumption closer to matching real human behavior, as well as ways in which robots can remain flexible to human behavior that strongly deviates from rationality.
Analysis of the Diversification of Symbolic Systems in the Human Evolution

Abstract Description: In the evolution of first symbolic information systems from early hominids to the present human beings, many symbolic systems have evolved, including language, art, music, myth, math and science, among others. Working from Deacon's biosemiotic information theory I will explore how distinct each symbolic system is with respect to language, comparing and contrasting chimpanzees in experiments using symbolic lexigrams; early hominids in symbolic systems like 'mate contract', the incest taboo, kinship identity, group identity, art, music and myth; and contemporary humans in symbolic systems like religion, math, philosophy and science. Although always intertwined, three distinct roles of symbolic system are identified – communication, knowledge, and normativity – and explored for the power advantages they provide to members of a social group by means of emergent social constraints. At last, the original sources of these constraints are suggested to be associated with distinct types of constraints (universal ones?) of each sort of symbolic systems, respectively, of language, music, marriage and myth, and math and science. By means of this exploration, I propose a hypothetical second symbolic hierarchic transition in the human evolution, from humans around ten thousands years ago, before first civilizations, to contemporary humans of our present society, and analyze its features and validity.
Abstract ID: IS4561129

Artificial Intelligence Will Touch the Bottom Line of “God”

Abstract Topic: Global Forum on Artificial Intelligence (GFAI)

Author Name: Chen Wang 1*

Company/Organization: New Civilization International Cooperation Organization

Abstract Description: "God" here refers to the vast nature - the universe. The bottom line of “God” is that human beings can not infringe upon their most basic exclusive right—the right of “subject” production. The existence of subjectivity is the result of the evolution of the universe over 10 billion years, it has extremely complex and special mechanism, it is very difficult for human beings to complete the production of subjectivity. Because of the arbitrariness of artificial synthesis, the evil, violent and destructive “monster subject” will be pervasive in the world, which will destroy the social value, ethics and social significance of human beings, bring unresolved chaos to human beings and the whole life world, and its danger is far greater than any other man-made disasters and natural disasters. "Monster subject" will inevitably be regarded as evil, Human beings will prohibit it from all aspects of system and law. But AI seems not to realize the seriousness of this problem, they are trying to lead AI to super-AI, the aim of this kind of thinking is aiming at the bottom line of “God”, which is a very dangerous signal.
Autonomy as a Fundamental Feature of Intelligence and the Perspectives of Its Artificial Implementation

Abstract Topic: International Conference on Philosophy of Information (ICPI)

Abstract Description: The concept of autonomy has a long intellectual tradition with diverse definitions typically formulated in specific, restricted contexts of the relationship between human individuals and collectives. The present paper is a proposal of the concept of autonomy consistent with the scientific view of the world formulated in terms of information and its dual selective and structural manifestations. The consistency is achieved by the assumption that information systems can interact and practically always interact at least with their intermediate environment and therefore are always a subject of external influence, but that there is no one-way action involved but mutual interaction. Thus unavoidable transformations change components of the system, but not necessarily the system itself understood as a structure. Autonomy is understood as a concept applicable only to complex systems equipped with structures satisfying the condition of structural stability. This means that the structure preserves its identity in interactions with the structured environment. Since structures are manifestations of information which are dual to selective manifestations of information involved in choices and every complex action consists of a chain of choices (selections), the preservation of the structure is associated with the sequence of selections which can be interpreted by an external observer as directed by some goal. However, it is the preservation of the structure which generates the goal, not goal which generates the chain of selections. Preservation of the structure does not mean its static form. The initial structure may evolve to a higher level of complexity, under the condition that its original structural information is preserved. (Abbreviated version of abstract submitted earlier)
Abstract ID: IS4S182149

**Abstract Topic**: Global Forum on Artificial Intelligence (GFAI)

**Author Name**: Lingjie Pu 1 *
**Company/Organization**: Liaoning Technical University

**Author Name**: Fanhui Zeng 2
**Company/Organization**: Liaoning Technical University

**Author Name**: Sicong Guo 3
**Company/Organization**: Liaoning Technical University

**Abstract Description**: The factor space is the “gene space” that describes things, and each dimension of it is the gene that makes up things. The earliest name of the gene is factor, the factor is the gene in a broad sense, so using the “factor space” to describe things is more universal. Background base is an important concept in factor space theory, which is to describe a contour of information distribution. Inner Point Judgment Method, an information contour extraction method, whose principle is to delete the inner points of a given data set and save its boundary points. In this way, the original data set contour is represented by a few of boundary points. And then information compression and information representation are realized. Base Point Classification Algorithm (BPCA) uses Inner Point Judgment Method to pack the information of each class, obtain knowledge contour of each class, and then use the knowledge contour to make predictions and decisions. Compared with the mainstream classification algorithm, BPC algorithm has two advantages. On the one hand, lower time complexity fits classification of large data. On the other hand, when prediction occurs, a point is far away from any current knowledge contour, think of it as a new class and label it. Therefore, BPCA can find new classes in the prediction. Although BPCA has performed well on convex data set, it is still necessary to continue research on non-convex data set. For the processing of non-convex data sets, on the one hand, many small block convex data sets can be obtained by cutting a non-convex data set, and then processed. On the other hand, some factors can be linearly transformed to obtain a convex data set, and then processed by BPCA.
Bateson Information Revisited: A New Paradigm

Abstract ID: IS45125

Abstract Topic: General Submissions

Author Name: Jaime Cardenas ¹ *
Company/Organization: University of Maryland
- Baltimore County

Author Name: Tim Ireland ²

Abstract Description: The goal of this presentation is to explain a novel information paradigm based on the definition of information by Gregory Bateson. As will be elucidated, Bateson information incorporates a quantitative/objective perspective with a qualitative/subjective perspective. These perspectives develop from Impersonal/Objective/Absolute Information and Personal/Subjective/Relative Information, to Shannon/Distilled Information. Leading to the contention that Bateson information is enough to account for syntactic and semantic information. In short, Bateson information subsumes Shannon information. Additionally, Bateson information may be used to dispute the assertion by Wiener that information is a third fundamental quantity of the Universe. A widespread belief that is not correct. The idea that Bateson information is enough to account for syntactic and semantic information results in the posing of the Fundamental Problem of the Science of Information: i.e., the problem of explaining how human beings came to our current state of phylogentic and ontogenetic development. How a self-referential process leads humans to develop from a state in which their knowledge of the organism-in-its-environment system is almost non-existent to a state in which the organism not only recognizes the existence of the environment but also sees itself as part of the organism-in-its-environment system. This impacts our ability to engage with the environment so as to navigate effectively through it. In this process we are able to transform our environment to make it amenable to our distinct needs. This is what we as human beings do on a daily basis, fully dependent on the Bateson information process. Recognizing this as a fundamental problem that we need to address is the first step leading to a Unified Theory of Information. The definition of information by Bateson is the key toward such a goal as well as fully supporting the notions relevant to biosemiotic distributed cognition.
Birth and Evolution of the Symbolic Communication of Language in the Human Beings

Abstract Description: In Symbolic Species (1997), Deacon has presented the core lines of a theory of the birth and evolution of symbolic communication of language, unique to humans. This presentation aims at presenting the main points of Deacon's theory to explain the origin and evolution of our language and our symbolic species, a special transition that is summarized as follows: 1) Relaxed selection processes with the evolution of more cooperative social life; 2) Development of the first simple symbolic information systems of the first hominids, which were not language yet as we know today; 3) Long evolution of the first symbolic systems to language during nearly two millions years, a bio-cultural co-evolution of both language and brain; 4) Emergence of human beings as we know today. The presentation examines the main foundations of Deacon's theory which are the hierarchic structure of the communication, the learning difficulties of symbolic systems, the special conditions for the emergence of a simple symbolic system, and the gradual evolution from the first symbolic systems to language. It also shows how since 1997 Deacon and collaborators have deepened its foundations, with the formulation of a theory of the origin of teleodynamics of living beings, that give birth to self, biological functions, processes "for itself" of living beings (Incomplete Nature, 2012); with the gradual construction of a theory of 'Emergent Dynamics' and of processes underlying the hierarchic transitions in the evolution of living beings, reformulating key aspects of natural selection; and with the gradual refinement of the understanding of the hierarchic processes involved in the theory of information, in the symbolic communication of language and symbolic systems. With this in hindsight, the presentation re-analyzes critically the hypotheses for the first symbolic systems and the possible ways of their evolution to language and human species.
Blurring of the human and the artificial. A conceptual clarification

Abstract Description: Due to certain progress made in AI and related fields it is a common agreement of facing a blurring of the human and the artificial. This presentation will argue that this agreement is rather one that pertains to anthropomorphic notations when dealing with computers and computer-based devices than one that is justified by engineering results. In fact, the language used to describe mechanic functions hides what ontologically goes on and how the autonomy of humans can be endangered. The clarification intended here uses Rafael Capurro's distinction between agents and patients and translates it into a distinction between self-organising systems and non-self-organising entities. One important question is how the “coupling” of self-organising systems with non-self-organising entities can be conceptualised. It will be argued that the “merger” will not provide a new quality beyond humans (social systems) and machines but a new quality within the scope of the first only. It's, in principle, a social system that differs by the usage of technology. However, if designed the wrong way, the qualitative change can be detrimental to the whole social system. This is the case when the artificial restricts the autonomous capability of the human.
Causal Analysis Method of Multi-Targets

Abstract: Causal analysis is a very important method of knowledge extraction in factor space theory. Usually its form of the header is \((f_1,\ldots,f_n;g)\), where \((f_1,\ldots,f_n)\) is conditional factors, \(g\) is result factor. However, factor analysis in the form of a header \((f_1,\ldots,f_n;g_1,\ldots,g_m)\) is the ultimate general form. Multi-target means that there are multiple result factors, that is \((g_1,\ldots,g_m)\). When the value of \(m\) is too large, the current factor analysis method is difficult to solve. Therefore, in order to solve the above problems, it is very meaningful to study multi-target factors causal analysis method. For multi-target factor analysis, our idea is to package multiple targets into a single target and then process it in single factor causal analysis. The specific method is to calculate the decision matrix of condition factors to result factors, and then calculate result factors similarity matrix, and finally obtain result factors classification matrix. After adding the weights, calculate the degree of decision of condition factors to result factors. Finally, the rules are extracted like single target causal analysis. Multi-target causal analysis method packages the factors with high correlation among result factors, and after adding the weights, it is the same as the single target causal analysis method. This method has obvious effects on multi-target data sets with high correlation, and is currently applied in projects with multi-objective balance of bank assets and liabilities.
Abstract ID: IS45148

CLOUD COMPUTING AS A STEP TO A HIGHER-ORDER AI

Abstract Topic: Future of the Global InfoSphere (FGIS)

Author Name: Rao Mikkilineni
Company/Organization: Golden Gate University

Author Name: Mark Burgin
Company/Organization: UCLA

Author Name: Eugene Eberbach
Company/Organization: Toronto, Canada & Seekonk

Abstract Description: Cloud computing approach addresses how to make the right resources available to the right computation to improve scaling, resiliency and efficiency of the computation. In this paper we argue that cloud computing indeed, is a new paradigm for computation upgrading it to a higher order of artificial intelligence, and we put forward cloud automata as a new model for computation. A high-level artificial intelligence requires infusing features of the human brain into AI systems. One of the central features is that the brain learns all the time and learning is incremental. Consequently, for AI, we need to use computational models, which reflect incremental learning without stopping (sentience). These features are inherent in reflexive Turing machines, inductive Turing machines and limit Turing machines. It is possible distinguish several paradigms of computation, including Mainframe, PC, Network, Internet, Distributed, Grid and Cloud Computing. New computing paradigms may involve various technologies besides VLSI such as quantum computing, biologically inspired computing, nanocomputing, optical computing, neurocomputing. Theoretical models of computing are naturally divided into three classes: sub-recursive, recursive and super-recursive algorithms and automata. To construct cloud automata, we use the mathematical theory of Oracles, which include Oracles of Turing machines as its special case. This allows developing a hierarchical approach to artificial intelligence based on Oracles with different ranks. The developed approach includes Oracle AI as a special case providing new tools for exploration of artificial intelligence in general and Oracle artificial intelligence. Discussing named-set approach and Oracle-based evolution of computations, we describe an implementation of a high-performance edge cloud using hierarchical name-oriented networking and Oracle-based orchestration. We demonstrates how cloud automata provide means for improving resiliency, scalability and efficiency of computations. A control overlay allows microservice network provisioning, monitoring and reconfiguration to address fluctuations in their behavior.
Compression, decompression and dynamical depth: How supercomputers are less complex than bacteria

Abstract: Algorithmic complexity is generally accepted as the standard for measuring information entropy. The fundamental assumption is that the more compressible the less complex. This leads to the paradoxical result that an intact organism is less complex than that same organism if ground-up and mixed in a blender. This paradox results from a failure to take into account the special sort of decompression that constitutes organism development. Decompression is a form of interpretive process. If the process of decompression that restores the size of a previously compressed description or image is algorithmically generated it is lossless and reversible. But if a lossy compression process is decompressed by adding new data that compensate for that which was sacrificed in compression then the process can generate new complexity in an irreversible way. The DNA in a cell is a significantly compressed source of organism information but the decompression process of development in multi-celled organisms is a decompression process that generates additional complexity using self-organizing and Darwinian dynamics that take advantage of stochastic molecular and environmental factors. This introduces a new source of information by virtue of the context sensitivity of this process and the way that it incorporates incidental physical properties of the molecular and cellular medium itself into the decompression process. The extent to which the information becomes modified by incidental physical properties of its medium an orthogonal dimension of complexity is created in contrast to the algorithmic complexity of its statistical properties. This has been termed dynamical depth, and it is an orthogonal dimension of complexity that is characteristic of organisms but not machines nor randomized organism cells and molecules.
Computing devices as information operators

Abstract Description: Operators have become one of the most important tools in theoretical physics and are also becoming an important tool in information theory. Computing devices are information transformers and generators. That is why in this work, we develop operator models of computing devices and study their properties based on the ontological operator theory. An operator is an object (system) that operates, i.e., performs operations on, some objects, systems or processes which are called operands of this operator. In other words, an operand is an object, system or process operated by an operator. Thus, being an operator or an operand is a role and a characteristic of a system. One and the same system/object can be an operator in some situations and an operand in other situations, as well as an operator with respect to some systems and not an operator with respect to other systems. All operators are systems, but not all systems are operators as they can exist and function in sizeable isolation from their environment. To construct a mathematical operator theory, it is necessary to organize or represent operands in the form of an operating space, i.e., the space which is transformed by an operator. Different types of operators function in distinct operating spaces. For instance, operators of quantum mechanics use Hilbert spaces as their operating space. Information operators function in information spaces. As there are diverse types of information, representation of them by operators demands different types of information spaces. According to the general theory of information, we differentiate syntactic, semantic, pragmatic, algorithmic, cognitive, emotional and effective information. Consequently, modeling computing devices by information operators, we can treat them as tools for transformation and generation of distinct kinds of information. Here we consider syntactic, semantic, and pragmatic information. This brings us to syntactic, semantic, and pragmatic information spaces.
Abstract Description: Based on the factor space theory, this paper proposes a kind of clustering algorithm—concept clustering algorithm. When the number of atom concepts is k, the number of concept algebra is $2^k$. Assume k is very big, except the atom concepts, the number of other non-empty concepts is $2^k - k$, which is big naturally. Thus, what we focus on in this paper is to decrease the number of concepts effectively. To decrease the amount of those unnecessarily over-accurate clusters at the beginning, threshold value $\theta$ is introduced. Then choosing the factor with the biggest resolution as the division factor at each step, the initial complex concept clustering tree can be constructed. It will happen that the sample number of some clusters is rather small, then there is no need to keep this separate cluster. Therefore, those clusters with a small amount of samples can be combined with its nearest neighbors. Here, the percentage of the total number of clusters $\sigma$ is introduced to determine the number of clusters needed to be combined. Eventually, a simple tree with fewer clustering rules can be generated. An example is used to implement the specific clustering process, where the visualization effect is shown step by step. The algorithm proposed in this paper is easy to operate and understand. Not all the factors are concerned, only those contribute the most to the division at each step will be included in the clustering tree. In addition, apart from the final clusters, the clustering rules for other steps can also be established, with distinct clustering reasons as well. The concept clustering algorithm in this paper is based on the factor space theory, which shows satisfactory results. It is anticipated that more values can be dug by the theory.
Abstract ID: IS4S13139

Concepts of Information in Artificial Intelligence Research

Abstract Topic: Theoretical Information Studies (TIS)

Author Name: Yixin Zhong

Company/Organization: Beijing University of Posts and Telecommunications

Abstract Description: There have been different concepts of information existed till the present time that frequently leads to confusions. This phenomena is caused by the fact that different researchers have different backgrounds. We want to make clear the different concepts in the article. This must be one of the preconditions in theoretical information studies. The researchers in communication engineering need only the concept of formal information, or statistically syntactic information, which is concerned only with the states of the signal waveforms. However, the researchers in Artificial Intelligence (AI) will need two concepts of information. This is because of the fact that there exist two categories of information in the field of AI research. The first category of the information is the one related to object event and is termed as 'object information' whereas the second category of information is the one related to the subject's perception and is called 'perceived information'. The two concepts of information are obviously related to, but are also different from, each other. The concept of object information can be regarded as similar to the one in communication engineering while the concept of perceived information is very different from the one in communication engineering. The concept of perceived information is much complex than that of object information because the object information reflects only the object's factor - the formal state of the object - whereas the perceived information reflects not only the object's factor but also the subject's factors - the utility factor that the object provides to the subject and the meaning factor that the subject understand about the object. In the terminology, they are named as syntactic, pragmatic, and semantic factors. Therefore, both the concept of object information and the perceived information are needed in AI field while only the concept of object information is needed in communication field.
Connecting the Dots: Information in Historical Perspective

Abstract Description: This talk will look at the development of concepts of information since the eighteenth century, noting diverging views of what "information" is and the optimism and pessimism that different notions have given rise to at different times.
Abstract ID: IS4SI32

Convention and mutual misunderstanding

Abstract Topic: The "I" in AI, and the Meaning in Information

Author Name: Liqian Zhou

Company/Organization: Department of Philosophy, Nanjing University

Abstract Description: It is believed by many philosophers that Lewis-Skryms signaling game theory brings fundamentally new insights to questions concerning with the explanation of meaning. As a result, studies of signaling games are prosperous in recent years. Nevertheless, this presentation does not intend to discuss the technical problems of signaling game but concerns with the epistemic aspect. The question the presentation tries to discuss is that whether the selection and maintenance of a strict Nash equilibrium in a signaling game identify with the establishment of a signaling system. In the case of a signaling game at a strict Nash equilibrium, the receiver plays the act proper to a state the sender perceives. In other words, the act causally maps the state correctly. According to the evolutionary approach to signaling games, strict Nash equilibria in a signaling game equal to signaling systems. That is to say when the causal relationship between the act and the state is established, a signaling system emerges. However, the causal relationship can be established without signaling systems in the case of mutual misunderstanding. There may be two orders of misunderstanding in signaling games: the first-order between senders and receivers and the second-order between the observer and the signaling game s/he observes. The source of mutual misunderstanding is a long-standing confusion in information studies: confusing signal sequence and pragmatic effects of information with informational content. In the case of signaling games, philosophers take the success conditions of acts as the success conditions of communication while the mutual misunderstanding argument shows that they are different. In order to avoid mutual misunderstanding without appealing to common knowledge in signaling games, the distinction between signals, informational content and acts should be made clear first.
Countermeasures for the management of colleges and universities Internet public opinion in the dilemma of “The spira of silence”

Abstract Topic: International Conference on Philosophy of Information (ICPI)

Author Name: Xiaoyi Yuan

Company/Organization: Wuhan University of Technology

Abstract Description: The mobile Internet's popularity covers almost everyone in the time of we-media. So the spread of Internet public opinion requires new application limits, boundaries, operates to the theory of"The spira of silence" during the using procedure. According to this: colleges and universities should adjust their managements of Internet public opinion to ensure the efficiency and quality of their work.
Cultural changes in the global information age

Abstract Topic: International Conference on Philosophy of Information (ICPI)

Author Name: Huiting Li

Company/Organization: Xi'an Jiaotong University, Humanities and Social science School, Xi'an, Shaanxi.

Abstract Description: Cultural changes run through the historical development of the human society. Only by insighting into the cultural changes in the global information age can we grasp the development and future of contemporary culture. Contemporary culture has two major trends of globalization and informatization. This paper focuses on the background of informatization of contemporary culture. Currently, informatization associated with globalization has strengthened the interdependence of national economies, changed the international environment for their development, and enriched their ways of interaction. Under the unprecedented open international environment, the development of any country can no longer be carried out in a closed state. The influence of international public opinion on national development is becoming increasingly important. As a big developing country, China has to communicate with other countries in an all-round and multi-channel way so that the world can better understand China and China can create a good international public opinion environment for its own development. This paper will spread out expositions for three aspects: Informatization tide promoted the rise of information culture industry; Informatization tide intensifies the cultural interaction and competition among countries; Informatization tide enriches cultural communication among countries.
Difference between the Real World and Virtual World

Abstract Topic: International Conference on Philosophy of Information (ICPI)

Abstract ID: IS4597188

Author Name: Wei Wang

Company/Organization: Xi'an Jiaotong University

Abstract Description: Development of virtual reality brings an old question on difference between the real world and unreal world. I argued that the virtual world is a representation while the real world is not, from the analysis of the minimal definition of representation. After that, the thesis is demonstrated again from different theories of scientific representation. Finally, based on the thesis and the scheme-interpretation approach, I argue that interpretation is a sufficient and necessary condition for scientific representation and that Contessa's account is better than alternative theories of scientific representation.
Abstract ID: IS45189136

Digital Literacy for Humanity in the State of Flux: An Urban Narrative

Abstract Topic: Future of the Global InfoSphere (FGIS)

Author Name: Shima Beigi 1 *

Company/Organization: Mindfulness Engineering™

Abstract Description: Digital literacy is the ability to locate, organize, understand, evaluate, and analyse information using digital technology. Combined with urbanisation, the shift of population from rural areas to cities, digital literacy becomes more than mere the ability of one individual to engage with information. As people start to engage with information flow, richer dimensions of human life start to permeate and extend into this field of information. Information becomes richer. But what about our lives? Exploring the synthesis of urbanisation and digitalisation is an essential part of future generations of cities aka smart cities as they rely on ICT for their inherent functionality. The relationship between technology, societal readiness for technological adoption is not linear. Additionally, mass migration from developing to developed countries has challenged cities to rethink social integration and urban inclusion. Therefore, it's not clear to what extent can the movement of ICT based cities, create a harmonic relationship between urbanisation and digitalisation without leaving the ever changing emotional landscape of people out the equation?
Disseminated Computation, Cognitive Domestication of New Ignorant Substrates, and Overcomputationalization

Abstract Title: Morphological & unconventional computing (MORCOM)

Abstract ID: IS4SI10120

Abstract Description: What I called “eco-cognitive computationalism” considers computation in context, following some of the main tenets advanced by the recent cognitive science views on embodied, situated, and distributed cognition. It is in the framework of this eco-cognitive perspective that we can usefully analyze the recent attention in computer science devoted to the importance of cognitive domestication of new substrates, such as in the case of morphological computation: this new perspective shows how the computational domestication of ignorant substrates can originate new unconventional cognitive embodiments, which expand the processes of computationalization already occurring in our societies. I will also introduce and discuss the concept of overcomputationalism, as intertwined with the traditional concepts of panchanism, panformationism, and pancomputationalism, seeing them in a more naturalized intellectual disposition, appropriate to the aim of bypass ontological or metaphysical overstations. What I call overcomputationalization refers to the presence of too many entities and artifacts that carry computational tasks and powers. Overcomputationalization 1) often promotes a plenty of possible unresolvable disorganizational consequences, and 2) tends to favor philosophical reflections that depict an oversimplified vision of the world. Moreover, it tends to generate too many cognitive constraints and limitations, which lead to a weakening of human creative (abductive) cognitive activities, as I have illustrated in the last chapter of my recent book The Abductive Structure of Scientific Creativity (2017), and, because of the excess of redundant cognitive/informational features attributed to entities (features often exogenous to the original functions of them) it tends to prevent human intellectual freedom to benefit from that cognitive simplification that is characteristic of the absence of informational overloads.
Abstract ID:
IS4SI28163

**Distributed consciousness: information processes that may build a global mind.**

**Abstract Topic:**

**Author Name:** Francis Heylighen

**Company/Organization:** Free University of Brussels

**Abstract Description:** According to theories of situated, embodied, enactive and distributed cognition, mental processes such as perception, memory, and problem solving extend well outside the brain. For these processes, we rely on our body, environment, tools, technologies, symbols and other people. The Internet functions as a universal information medium that may coordinate all these components and processes into a global brain, i.e. a nervous system for the planet. However, a recurrent issue is whether such a distributed cognitive system would exhibit consciousness. To approach that issue, I review basic theories of consciousness and examine in how far they allow an "extension" outside of the brain. I argue that the basic requirement is that there is strong co-variation or coordination between internal and external processes, which perhaps can be measured with conditional entropy (rather than the mutual information that is more commonly used to measure "information integration"). I discuss several observed examples of "extended" consciousness, and wonder whether they could develop into a global consciousness residing in a "noosphere".
Does AI have concept?

**Abstract Topic**: International Conference on Philosophy of Information (ICPI)

**Author Name**: Pei Li

**Company/Organization**: Tsinghua University

**Abstract Description**: The word “concept” has been used in many areas, including in the area of artificial intelligence. But there are different meanings on concept, it is necessary to clarify what is concept and what is the relationship between AI and concepts. This paper will demonstrate the different definition of AI and the different meaning of concept and then analyze which AI has which concept. This paper classified AI into three different types of systems: analytical, human-inspired, and humanized artificial intelligence. Analytical AI generates a cognitive representation of the world and using learning based on past experience to inform future decisions. In addition to cognitive elements, Human-inspired AI can understand human emotions, and consider them in their decision making. Humanized AI shows characteristics of all types of competencies, which is able to be self-conscious and is self-aware in interactions with others. Corresponding to the classification of AI, concept has been classified into three aspects too. One is the lexical concept (concept 1), the second one(concept 2) concerning the cognitive area, and the third one(concept 3) concerning the philosophical area. In the first aspect, a concept is a name or label that regards or treats an abstraction. In the second aspect, a concept is assumed to be the mental representation of a category or class. In the third aspect, having a concept as being able to have propositional attitudes about x as x. After analysis, this paper concludes that the analytical AI have concept 1, but don't have concept 2 and 3; Human-inspired AI have concept 1 and concept 2, but don't have concept 3; Humanized AI both have concept 1, concept 2 and concept 3.
Dynamic Factor Reduction in Factor Space

Abstract Topic: Global Forum on Artificial Intelligence (GFAI)

Abstract Description: In practical applications, the factor analysis table is incomplete, and the number of samples in the factor table will constantly change. If decision degree is recalculated for each change in the number of samples, this will not only change the rules of inference, but also increase the training time, so it is necessary to study the dynamic factor reduction. The core of the static factor reduction algorithm is decision degree of computation. If the newly added samples have no effect on the degree of decision, the reduction result will not change, and the inference rule will not change. The principle of the dynamic reduction algorithm is that if the newly added samples have an influence on decision degree, it can only affect the original decision class. Usually there are two kinds of influences. One is that the information of the added sample is consistent with the original decision class, and the inference rule is unchanged; the other effect is contradictory to the original decision class, breaking the original inference rule. For the above reasons, it is necessary to mark the decision class before adding the sample, then count the decision class of the change and calculate the decision degree, finally, sort the decision degree and extract inference rule. The dynamic factor reduction algorithm mainly makes up for the problem of repeated calculation time consumption in causal analysis algorithm.
Eccentric Computational Embodiments. Cognitive Domestication of External Entities

Abstract Topic: International Conference on Philosophy of Information (ICPI)

Abstract ID: IS45138

Author Name: Lorenzo Magnani

Company/Organization: University of Pavia,
Pavia, 27100 ITALY

Abstract Description: Eco-cognitive computationalism sees computation in context, adopting the intellectual visions advanced by the cognitive science perspectives on embodied, situated, and distributed cognition. It is in this framework that we can fruitfully study the relevance in recent computer science devoted to the simplification of cognitive and motor tasks generated in organic entities by the morphological aspects. Ignorant bodies can be cognitively “domesticated” to become useful “mimetic bodies”, which originate eccentric new computational embodiments capable to render an involved computation simpler and more efficient. On the basis of these considerations we will also see how the concept of computation changes, being related to historical and contextual factors, so that the "emergence" of new kinds of computations can be epistemologically clarified, such as the one regarding morphological computation. Finally, my presentation will introduce and discuss the concept of overcomputationalism, as intertwined with the traditional concepts of pancognitivism, panformationalism, and pancomputationalism, seeing them in a more naturalized intellectual disposition, more appropriate to the aim of bypass ontological or metaphysical overstatements.
Ecological Transformation and Human-Machine Symbiosis: A Study of the Relationship between Human and Artificial Intelligence in the Perspective of Information Philosophy

Abstract Description: The current research on the relationship between human and artificial intelligence mainly focuses on whether artificial intelligence can become an independent thinking, whether it has the risk of replacing human beings, even enslaving and destroying human beings. From the dimension of information to the relationship between human existence and human and ecology, Gaia hypothesis regards people as a part of the ecological whole, human and ecological dependence, competition with the symbiosis, and the evolution of the ecological whole. Information philosophy can generalize it into an information system that is interdependent, competitive, and co-evolving. The holographic nature of information points out that human beings, as the source of natural ecological information systems, inevitably imprint all the information of this system. The essence of human existence is not simply the sum of social relations, but the condensation of the relationship of ecological information systems including social relations. The generation of artificial intelligence is a new ecology while changing the ecology with the development of human knowledge systems and industry. The transformation of natural ecology into humanized nature, the transformation of ecology is full of the transformation of symbiotic structure, the symbiosis of human and natural ecology is transforming into the symbiosis of human and humanized ecology (including artificial intelligence), manifested as the continuous reduction of natural species, artifacts The number is constantly increasing. People use rational understanding of the objective world. The development of human civilization is based on the accumulation of rational knowledge, but the complexity of the perception of nature to society has long exceeded the scope of rational ability. As an information evolution of human cognition, artificial intelligence develops as a cohesive information of humanized natural ecosystems. Under certain conditions, it may generate autonomy and become a true common species of human beings.
Email importance evaluation in mailing list discussions

Abstract ID: IS4541

Abstract Topic: General Submissions

Author Name: Xiaohan Jiang

Company/Organization: Beijing University of Technology

Author Name: Chunming Hu

Author Name: Kun Jiang

Author Name: Sun Jie

Author Name: Shen Qi

Abstract Description: Nowadays, mailing lists are widely used in team work for discussion and consultation. Identifying important emails in mailing list discussions has significance to content summary and opinion leader recognition. Previous studies only focus on importance evaluation of personal emails and there is no consensus on the definition of important emails. Therefore, in this paper we consider the characteristics of mailing lists and study how to evaluate email importance in mailing list discussions. We firstly propose ER-Match, an email conversation thread reconstruction algorithm to construct email relationship network. In the network model, nested quotation relationships are considered and we formulate the important email. Secondly, we propose a feature-rich learning method to predict the importance of new emails. And we characterize various factors affecting email importance in mailing list discussions. Experiments with public available mailing lists show that our prediction model outperforms baselines with large gains. Keywords: Email thread reconstruction • Email importance modelling • Feature evaluation.
Abstract ID: IS4583133

Equivalence, (Crypto)Morphism and Other Theoretical Tools for the Study of Information

Abstract Topic: Theoretical Information Studies (TIS)

Author Name: Marcin J. Schroeder

Company/Organization: Akita International University

Abstract Description: Abstract: Following the idea introduced in my earlier work of the meaning of information as a relationship between information systems, this study is presenting theoretical tools for the analysis of this relationship and some consequences of their use for philosophical reflection on semantics of information. Common sense discussions of the meaning of information usually assume that the same information can be encoded or symbolized in many different ways without alteration of the meaning. Considering informational character of reality, we can extend this relationship (equivalence) between signs to absorb the concept of meaning as another instance of informational relation between informational entities of both sign and its denotation. However, this step is nontrivial, as the experience of logic tells us about the dangers of self-reference and the problem of non-definability of truth demonstrated by Tarski. We need precise theoretical tools to analyze relationships between information systems and between instances of information. These tools are also necessary for the definition and analysis of the levels of informational abstraction extended beyond traditional linguistic and logical context. There is a very limited literature (e.g. of the authorship of Birkhoff) on similar problems occurring in mathematics in the study of our comprehension of mathematical structures giving us a stepping stone to a more systematic study in the broad context of the study of information.
Ethical responsibility versus ethical responsiveness in conscious and unconscious communication agents

Abstract Description: In our information age, humans and machines depend on each other ever more strongly, like as many “conscious” and “unconscious” communication agents. This makes actual Ch. S. Peirce's intuition of a semiotic re-interpretation of Aristotle's pragmatic foundation of modality in logic, interpreted as “formal semiotics”. This has an immediate scientific significance, when we recall that Peirce's semiotics is strictly related with his pioneering approach to a triadic algebra of relations, as formal foundation of a theory of signs, making independent “signifying” from any reference to some consciousness. Peirce's algebra of relations has been formally developed by A. Tarski into an axiomatic calculus of relations, by him successfully applied to set-theory in the foundations of logic and mathematics. This led to the development of Category Theory (CT) as a promising (algebraic) “arrow-theoretic” metalanguage of logic and mathematics. A relevant application of CT is the formalization of the “operator algebra” approach, both to quantum physics, and to theoretical computer science (TCS), quantum computing included. It is therefore significant the same coalgebraic modeling, both of “dissipative” quantum systems in the foundations of condensed matter physics, biological systems included, and of S. Kripke's modal relational semantics in TCS. In fact, the same “functorial” duality algebra-coalgebra is applied to model, on the one side, the system/thermal-bath far from equilibrium stability of “open systems”, living self-organizing systems included, and, on the other side, the coalgebraic semantics of a modal Boolean algebra with operators in TCS, with the effective possibility of developing algorithms satisfying moral optimization criteria for autonomous systems. This opens the way to a systematic comparison between, the moral “responsiveness” of natural (brains) and artificial (AI) systems unconscious communication agents, and the moral “responsibility” of their conscious human owners/designers, as to the common linguistic environment with its ethical constraints.
Abstract ID : IS4S128111

Exploration of Knowledge Base Construction Based on Comprehensive Information Theory and Hyper Topology Structure

Abstract Topic : Global Forum on Artificial Intelligence (GFAI)

Author Name : Qingyao Cui
Company/Organization : Beijing University of Posts and Telecommunications

Author Name : Yanquan Zhou
Company/Organization : Beijing University Of Posts And Telecommunications

Abstract Description : In this paper, we propose a novel method for constructing a knowledge base by combining the Comprehensive Information Theory (CIT) and the Hyper Topology Structure (HTS). Then, we design a new kind of knowledge base by using our method on a small knowledge community in mathematics as an example, called CIHT-KB. We mainly did the following work: (1) We use the Comprehensive Information Theory to reanalyze the composition of knowledge from three perspectives: grammatical, semantic, and pragmatic. The grammatical information represents the external representation of knowledge, and the semantic information represents the internal meaning of knowledge. Meaning, pragmatic information represents the usefulness and worth of knowledge. The three perspectives are interrelated and mutually influential, and explains more deeply how knowledge exists and is composed. (2) Based on the “Comprehensive Information” representation about knowledge, we use HTS to organize it reasonably, and exploit the expansion and contraction features of Hyper Nodes (HN) and Hyper Line (HL) to better represent the hierarchical characteristics of knowledge. Meanwhile, the process of thinking and reasoning when humans use knowledge to solve problems is well explained by the walk-through on the various paths of the HTS. (3) Starting with the basic discipline, we built a CIHT-KB based on a small but closed relatively knowledge community in mathematics. Nowadays, the knowledge base is gradually becoming a key link in the development of artificial intelligence. The new method for constructing a knowledge base which combines the CIT and the HTS not only enriches the means of knowledge representation, but also provides a new perspective for analyzing and mining knowledge itself.
Exploration of structural and kinetic components of physical information

Abstract Description: Exploration of structural and kinetic components of physical information. We know that “information is information, no matter, no energy”. Physically, information is deeply grounded in energy transformation processes. To show this, the concept of two complementary informative influences on energy transformation will be demonstrated with the model of an idealized monochord instrument (the monochord as a conservative system without considering dissipation). Information contained in the kinetics of the oscillating string can then be modeled as both: • generated by the structure of the instrument (spatial harmonics) and as • generating non-arbitrary motion structures (harmonic resonance) in other instruments with similar spatial harmonics due to similar scale, geometry and material properties. The idea of a reciprocal relationship between information kinetically transported in excited modes of media and information structurally represented by configuration is intriguing. It definitely is interesting, when adopting an evolutionary perspective. From an evolutionary perspective, the capacity to adapt to and to interact with environmental influences on structural integrity (structural stability) is seen as continuously evaluated by the process in time. Information in such a perspective could be described as both a store for patterns and relations between elements and as an influence on differential perpetuation respectively –said with the terms of a biologist - as a selecting influence. Modes of motion, in our model the spatial harmonics which the string can represent, can be superimposed, while configuration structures obey the Pauli principle. Both carry information but the dynamics of storage and selection differ strongly. The talk will develop this idea and present the state of research of the author, leaving room for discussions.
Abstract ID:
IS45I67104

From Information to Intelligence: A Relational Approach

Abstract Topic: General Submissions

Author Name: Tianen Wang

Company/Organization: Shanghai University

Abstract Description: Information is neither physical nor an abstract noun, but receptive relation. Based on which we can get a relational approach and therefore a better understanding of intelligence besides information. It's one of the most important processes that from matter and energy to information. Information as receptive relation generated based on matter or energy as physical entity. Matter and energy cannot be created or destroyed, but information is non-conservation and therefore can be created. That from source-receiver information agent to self-conscious information agent means the evolution of information; That from information agent to intelligent agent means the evolution from information to intelligence; And that from artificial intelligence to artificial general intelligence means that relational agent is information-based, and the essence of intelligence is the sum total of all information-based relations. Information agent is a relational agent that constructed by internal relations; and intelligent agent is a bidirectional cycle agent constructed by information-based inter-and inter- relations. At the same time, in the process of understanding information, intelligence and their relationship, intelligence and information constitute a bidirectional cycle of understanding. In this way, we can even get an informational interpretation of quantum mechanics, and establish a theory of quantum information, which is the embodiment of the theoretical advantage of the concept of information as receptive relation in the interpretation of quantum mechanics.
From information to semiotics: the critical mission bridge.

**Abstract Topic**: Future of the Global InfoSphere (FGIS)

**Author Name**: Terrence Deacon

**Company/Organization**: University of California, Berkeley

**Abstract Description**: Over the past century the term ‘information’ has become a mass noun referring to the quantifiable statistical properties of what we collect, transmit, store, and manipulate via our various analytical and communicative media. In non-technical contexts, however, the term ‘information’ retains three related denotations used in different contexts: referring to the medium (signal, channel, sign vehicle), its reference (meaning, representational content, aboutness), or its normativity (use-value, significance). Because referential and normative properties are non-intrinsic and interpretation-dependent they are typically excluded from scientific analyses or else operationally reduced to quantifiable relationships between extensive properties (as in the case of mutual information). Semiotic theories explicitly address the problem of interpretation and offer tools for qualitatively analyzing these non-intrinsic properties. Specifically, semiotic theory attempts to analyze different forms of referential and interpretive relationships and to determine how these forms depend upon and develop from one another. To date there is no accepted bridge linking these theoretical perspectives. Until this is developed both will remain fundamentally incomplete tools that provide a misleading fractionated picture of living, mental, and social processes.
From informational practice to the future of mankind

Abstract Topic: International Conference on Philosophy of Information (ICPI)

Abstract Description: With the expansion of the application scope of artificial intelligence, the division of labor of human subjects, the transfer of decision-making power and the pattern of wealth distribution will undergo profound evolution. The demands of fairness, justice and reasonable policies in the era of AI, have presented unprecedented challenges to the future distribution system of mankind. The future of AI has not only changed the transfer of human subject rights, but also the pattern of interest distribution. When started to give the subject rights to the machine, we also gave the moral decision of the subject, and finally we will face this a picture: Is the machine captive of humans, or is the human captive of the machine? Yes, we need a new type of “master servant dialectics.” When we will be captive of the machine one day, what we need to think about is this “control of control”, which will be the dilemma of the times! The informational practice in the era of AI has a complex situation. In the context of the separation and association between the subject and the world, value choices and moral decisions in the practice process will be prominent. At the same time, informational practice has increased social risks, and uncertainty has become a fundamental feature of human things (Hannah Arendt). When human beings have to face such a complex situation, we need to reconstruct the ethical order, and high vulnerability becomes the characteristic of the times. Science does not need to be responsible, enterprises imply responsibility, and politics only has the responsibility of justification. The ecological complexity of these interactions requires comprehensive innovation of civilization, which will be the common responsibility of the community of human destiny.
Abstract ID: IS4SI68

From Today's Information Alchemy to Tomorrow's Information Science.

Abstract Topic: The "I" in AI, and the Meaning in Information

Author Name: Jeremy Sherman

Abstract Description: Lacking an objective way to distinguish information users from information processors, teleological responsiveness from physical work, reference from dynamic coupling, or signal from noise, information studies remains an ungrounded field of research, reliant on impressionistic, and crypto-Cartesian, equivocating definitions of information. As such information science and philosophy are practiced like information engineering, and worse, engineering much like alchemy, the pursuit of gold with no understanding of chemistry. Today, information studies is an attempt to turn the infosphere into social and economic gold without an explanation for the emergence and nature of semiotic information. For information alchemy to mature into a true information science we must be able to explain the emergence of three qualities – normativity, reference and responsiveness. These three are inadmissible in the physical sciences and inescapable in the life/social sciences. We recognize information by way of an agent's functional response with reference to circumstances. In this presentation, I identify the field's unanswered foundational questions, explain how emergent constraint theory might answer them, and survey the variety of benefits to be gained if we can finally move information studies out of the dark ages of information alchemy.
Getting the 'I' into AI: Some clues from biology and mathematics

Abstract Description: Despite the fact that we have learned much from neuroscience over the past half century, our computational models seem to have advanced little in comparison. Rosenblatt's perceptron (ca. 1960) and Fukushima's neocognitron (1980) still dominate the modern intellectual landscape (though rebranded under new names). Here I shall argue for an approach to understanding the neural mechanisms of perception and cognition that takes as its starting point basic insights about the structure of the natural world and attempts to articulate the basic computational problems to be solved. Examples of this approach can be found in the Pattern Theory of Grenander and Mumford, and the High-Dimensional Computing framework of Plate and Kanerva. Gaining insight in neuroscience - and making true advances in artificial intelligence - will require building models, grounded in theory, which embrace the complexity and rich computational structure of biological neural circuits - i.e., laminar structure, recurrence, dendritic nonlinearites, and hierarchical organization with bidirectional flow of information.
Going Beyond Church-Turing Thesis Boundaries: Digital Genes, Digital Neurons and the Future of AI

Abstract ID: IS4SIS7

Abstract Topic: Theoretical Information Studies (TIS)

Author Name: Rao Mikkilineni 1 *

Company/Organization: Golden Gate University

Abstract Description: Church-Turing thesis deals with computing functions that are easily described by a list of formal, mathematical rules or sequences of event driven actions such as modeling, simulation, business workflows, interaction with devices, etc. All algorithms that are Turing computable fall within the of boundaries Church Turing thesis which can be stated as "a function on the natural numbers is computable by a human being following an algorithm, ignoring resource limitations, if and only if it is computable by a Turing machine." There are two paths to push the Church-Turing thesis boundaries. First is to search for computing models that solve problems that no ordinary Turing machine can solve. An example is the most popular problem in the theory of algorithms. This is the halting problem for an arbitrary Turing machine with a given input. The pursuit of superrecursive algorithms and inductive Turing machines follows this path. Second path addresses the main assumption in the Church-Turing thesis related to "ignoring resource limitations." Computation suffers when fluctuations occur in either the availability or demand for CPU and memory. In this paper, we argue that the Turing machine implementation by von Neumann provides a physical manifestation of a cognitive apparatus to represent and transform knowledge structures that are created by physical or mental worlds in the form of inputs and outputs. Note that Turing computable functions also include algorithms that define neural networks which are used to model processes that cannot be described themselves as algorithms such as voice recognition, video processing. Cognition comes from the ability to encode knowledge structures and their processing to transform them from one state to another just as genes and neurons in biology do. We propose that a new class of "structural machines" provide a solution to manage fluctuations without disrupting the computation itself.
Abstract Description: The notion of “habit” is at the center of a lively philosophical debate that shows how some ideas from classical thought are still plausible and useful to understand human behavior in ordinary life. Following Aristotle, we can intend habits through the process of “habits learning” which is a central topic in neuroscience and neurobiology. A habit is not only a mere automatism or a repetitive behavior, but also a stable disposition for action (practical skill), which entails the relationship between automatism and flexibility implying also control. The difference between habits and automatism or simple routines is that the former give control over actions, while the latter do not (Bernacer, Murillo, Lombo, Gimenez-Amaya). Our challenge is to extend the process to the social sphere, as habits can be shared and institutionalized in the form of rituals. Rituals can be seen as habits in a We-mode, they present the dimension of routine but also the active stable disposition for action, which shows how rituals play a fundamental role in individual and social life. We will move from a view that crosses philosophy and neurobiology and intends habits also as a goal-directed activity. We can intend this as ground for the Searlean view about We-intentionality. This perspective provides the ground for understanding the cooperation we need to engage and to institutionalize the ritual practice in social environments.
History of Information Philosophy in North America

**Abstract Topic**: International Conference on Philosophy of Information (ICPI)

**Author Name**: WANG YANLI

**Abstract Description**: Information philosophy is a new kind philosophy. This article mainly talk about information philosophy from the information technology, it will research when America philosopher start to think information technology and how to reflect the relations between information technology and society.
How Does Information Get its Meaning?

Abstract Topic: The "I" in AI, and the Meaning in Information

Author Name: Tyrone Cashman

Company/Organization: Solar Economy Institute

Abstract Description: In 1948, Claude Shannon wrote: "The fundamental problem of communication is that of reproducing at one point either exactly or approximately a message selected at another point. Frequently the messages have meaning that is they refer to or are correlated according to some system with certain physical or conceptual entities. These semantic aspects of communication are irrelevant to the engineering problem." Seventy years later, the common definition of information is simply the engineering one: "any type of pattern that influences the formation or transformation of other patterns." —Wikipedia But how can this be? The universe is filled with patterns that influence the formation of other patterns. We call it physics and chemistry. Yet, the vast majority of such patterns don't mean anything. If this is to be our new understanding of basic information, then how does some information get to be about something? How does a "pattern" carry one particular message and not another? What does it take for information to have meaning? First, to have meaning a pattern must refer to something that is not itself. This reference to another is called "aboutness" or "intentionality." Secondly, the pattern must be for someone, for some living being—not necessarily a human person. Meaning arose on the earth when living beings emerged. Nothing in the world of simple physics-chemistry is at risk. Everything in that world happens as it must, following the First and Second Laws of Thermodynamics. But in the living world, everything is at risk of dying. Nothing is certain. Another common definition is: "Information is the reduction of uncertainty." The future is only uncertain for living beings. Thirdly, the meaning of the pattern must be interpreted, or at least interpretable.
Abstract ID: IS4SI12164

How to reverse human downgrading

Abstract Topic:

Author Name: Tristan Harris

Company/Organization: Center for Humane Technology

Abstract Description: How we define problems dictate how we generate solutions. Information technologies and A.I. generate a cacophony of grievances and scandals, from data protection to paying us for our data. Tristan will speak about how seemingly separate problems- shorting attention spans, tech addiction, social isolation, outrage-ification, teen narcissism and depression (“influencer” culture), polarization, rise in conspiracies and breakdown of truth – are part of one connected system of mutually reinforcing harms arising from extractive tech platforms, which we call “human downgrading.” Tristan will diagnose the mechanics of human downgrading, and then lay out an agenda of research questions and design patterns based on of an increasing sophistication about human nature, and not more advanced deep learning methods or data collection, will help us arrive at solutions.
In Defense of Dualism

Abstract Description: It is tempting to reject dualism because it recalls overbearing churches and seems inelegant. However, the alternatives to dualism are worse. Science suffers, because the culture of science becomes dominated by "premature mystery denialism." The larger problem is economic and political. Rejecting fundamental ontology inevitably supports the new overbearing church, which is a tech industry that claims to own what is called "artificial intelligence" even though what they (we) are really doing is monopolizing the data of everyone else. Ethics and morality suffer as well, since the definition of personhood comes to serve commercial interests. Dualism clarifies what science can do and what it can't. Dualism unsullies business, ethics, science, spirituality, and philosophy.
**Abstract Description** : Informational process has been considered as a common way to explain mental representation. However, whether it is able to go further to cover the mentality of mental representation, apart from explaining the underneath process, is still an issue. The key question is this: Can mental representation ultimately be reduced to informational process? The answers "yes" and "no" will lead to quite different consequences. If mental representation can be reduced to informational process, then this might not only remove the distinctive features of mind but also open more possibilities to artificial intelligence. To some people this might be a good thing, but I doubt the truth of it. In my opinion, mental representation cannot be reduced to informational process. I will give my argument as follows: First, while “information” is a useful tool and an interesting way for us to understand mental representation, there are fundamental distinctions between information and the mental. There are a lot of things in the world carrying information, but not all of them are mental representation. Second, mental representation has its unique features that cannot be reduced to information. Representational content is not equal to informational content. The semantic properties of representational content cannot be characterized by informational content, and are not explained well by so-called information semantics. Third, since it has troubles explaining mental representation, AI based on the confident belief of the explanatory capability of information and data is not really intelligent as it calls itself.
Information components of legal processes and their complexity

Abstract Topic: Theoretical Information Studies (TIS)

Author Name: Mark Burgin

Company/Organization: UCLA

Abstract Description: Complexity measures allow reflecting critical issues and estimating efficiency of various processes and systems. Thus, to better organize functioning of the legal domain, it is logical to use complexity measures. In essence, any legal process is an information process in the legal domain involving one or several legal systems. Thus, our goal is the development of theoretical and practical tools for estimation of complexity of information processes, that is, complexity measures, in the legal domain with the goal to ameliorate functioning of the legal domain. Legal processes go in accordance with the rules of conduct in the legal domain. It is possible to separate three classes of such rules: 1. Laws, which are explicitly formulated and upheld by authorities. 2. Formal rules or norms of two types social and organizational. 3. Informal rules or norms of three types social, organizational and individual. Rules also have deontic modalities: obliged, forbidden and permitted. To represent systems of operational legal rules, we use logical varieties. The first step in elaboration of legal complexity measures is formalization of descriptions of legal processes. We use the Logic of Reasonable Inferences (LRI), as the tool for building a formal model of legal knowledge and formalizing descriptions of legal processes. LRI was utilized in the software system Argumentator implemented and empirically validated against a multitude of real life legal cases. To elaborate legal complexity measures, we use the theory of direct and dual complexity measures, as well as inductive complexity providing a system approach to estimation of complexity of information processes in the legal domain aimed at upgrading and modernization of its functioning based on information technology. Different aspects of legal processes demand specific complexity measures, which have different types. We construct, study and apply the following types: organizational, operational and representational complexity measures.
Information is the representation of energy

Abstract Description: Information is the representation of energy, energy is the noumenon and essence of information. Information and energy are both non-material and objective existence. They have identity. The information of subjectivity is also composed of quantum sequences. Humans consume a lot of energy in thinking, which also proves the identity of information and energy. Simple information does not exist and is only possible through the medium of energy. Information and energy constitute the two sides of an entity, which embodies the identity of information and energy. Information is energy. While material and energy are mutually transformed, Spirit is a special information of subjectivity. This unifies the material, the energy, the information and the spirit, thus, for the first time in history, the material and spirit are fundamentally linked.
Information ontology as anti-metaphysical approach

Abstract ID: IS45178

Abstract Topic: International Conference on Philosophy of Information (ICPI)

Author Name: Ping Wang 1 *
Company/Organization: Xi'an Jiaotong University

Author Name: Jian Wang 2

Abstract Description: Followed by the general review of various kinds of information ontology as metaphysical thoughts, two main approaches can be illustrated as 1) to understand the world entirely in informational sense, such as John Wheeler's "all things are information", pan-computational ideas, etc.; and 2) to separate the world itself from its informational understanding (Kantian ideas), such as Floridi's information realism, Chalmers' virtual realism, etc. The basic feature of this kind of metaphysics is its theoretical explanation for the constructivism of the whole world. However, metaphysics is undermining its study of existence itself by taking existence as substantial entities, attempting to construct the whole world, or separating existence and thoughts. We argue that 1) existence/being is becoming, not entities; 2) the world itself is always understood as the world correlated with us, whereas the pure external world is the concept of abstract speculation; and 3) the world is infinitely becoming, so there is no such thing as the whole world. To study existence, one should be aware that things only exist in the fields where the subject delineates a finite boundary. With the insight from anti-metaphysical approaches, this paper discusses three aspects of the information ontology. First, we argue that digital ontology is not valid. Without the context or fields defined by the subject, data are just abstract symbolic entities. Information is the product of ternary dynamic relationship among subjects, data, and contexts. Second, the so-called infosphere does not exist, while the real existence is the infinitely becoming information fields, for example, virtual reality and computer simulation are of different reality vis-a-vis the common daily reality. Third, such information ontology ideas can explain the unity of subject and object, and help explain the information activities of the future era.
Abstract ID: IS4S4

Information Processing, Information Networking, Cognitive Apparatuses and Sentient Software Systems

Abstract Topic: General Submissions

Author Name: Rao Mikkilineni

Company/Organization: Golden Gate University

Abstract Description: Advances in our understanding of the nature of cognition in its myriad forms (Embodied, Embedded, Extended, and Enactive) displayed in all living beings (cellular organisms, plants, animals and humans) and new theories of information, info-computation and knowledge are throwing light on how we should build software systems (in the digital universe) that mimic and interact with intelligent, sentient and resilient beings in the physical universe. Info-computational constructivism asserts that living organisms are cognizing agent structures who construct knowledge through interactions with their environment. They process information through their own cognitive apparatus and information exchange with other cognitive agents. Computing processes, message communication networks and cognitive apparatus are essentially the building blocks for sentient beings. Meanwhile, agent technology has progressed with mathematical models going beyond the boundaries of Church-Turing thesis. Their utility is demonstrated in the novel distributed intelligent managed element network architecture enabling self-managing information processing structures and improving the computational efficiency and resiliency going well beyond the boundaries of Church-Turing thesis. In addition, cognition as a learning mechanism is associated with the neural network computing model and has successfully been used to discern here-to-fore hidden correlations and insights from large data sets. We present the impact of these advances on conventional software engineering practice which, so far has been focused mainly on deterministic computing processes through programming languages. We address ways to design intelligent, sentient and resilient information processing structures that manage themselves and their environment in the face of non-deterministic interactions without stopping. We use the structural machine framework with a hierarchy of controllers managing computing structures (from browsers to databases) to provide dynamic reconfiguration. The controllers allow real-time global knowledge about available resources, service connection requirements, and their utilization at run-time to reconfigure logical connections as necessary.
**Information productivity - Sustainable development productivity**

**Abstract Topic**: International Conference on Philosophy of Information (ICPI)

**Author Name**: Hongyan Ma

**Company/Organization**: Xi'an Fanyi University

**Abstract Description**: The great breakthrough and innovation of modern information technology drive the economic development and society progress, which initiate major changes of modern social productivity, information technology convert into actual productivity (information productivity). The thesis introduces information thinking mode from the perspective of information philosophy, discuss the evolution information productivity in both information and material world, development and impact on sustainable development society. Firstly, combing the development process of productivity theory, analyzes the formation conditions and the historical evolution process of information productivity. Secondly, discusses that information productivity is a new form of productivity different from material productivity and spiritual productivity from the perspective of information activities. Thirdly, dialectically analyzes the static and dynamic characteristics, properties and internal operation rules of the factor system in the structure of information productivity. Lastly, point out that the realization of information productivity depends on the realistic conditions including economic, political and humanistic environment.
Abstract ID: IS45I7115

Information Technology Ethics and Human Survival Situation Based on Philosophical Analysis

Abstract Topic: International Conference on Philosophy of Information (ICPI)

Author Name: Yuan Yan

Company/Organization: Xi'an FanYi University

Abstract Description: To find an effective method of detecting hot issues of scientific and technological ethics that can increase the operability of the evaluation of social values, and promote the benign development of science and technology, based on the philosophical analysis, the theory of information technology and the situation of human survival are studied. The common word analysis method of scientific metrology is chosen to analyse the literature, and then draw the map of scientific knowledge to find out the ethical problems that the scholars pay attention to in the field of study and put forward the countermeasures and suggestions for these ethical problems. Subsequently, it examines the fundamental changes that modern information technology brings to human beings in recording, transmitting and processing information. These drastic changes directly shape the current living situation of mankind. The study shows that the research on information technology ethics in China remains to be strengthened. It is urgent to establish an effective ethical evaluation system for information technology and connect with the world. In addition, information technology already produces unprecedented changes and influence on the whole human existence situation.
Informational aesthetics - exploring the relationship between art information and intelligence

Abstract Description: Informational aesthetics – exploring the relationship between art information and intelligence John Holgate Director of Library and Information Services, Research and Education Building, St George Hospital, Sydney, Australia Consultant to CVM College of Fine Arts Sardar Patel University, Anand, Gujarat India Abstract The author examines the notion of informational aesthetics. He retraces the history of the concept developed in the 1960's by Birkoff, Bense and Mole and which sought to marry mathematics, computation and semiotics with artistic activity, based on Birkhoff's aesthetic measure, and to bridge the gap between science and the humanistic imagination. The failure of the cognitive school is attributed to the limitations of its data-driven view of art itself as an affordance of perception (Arnheim). The roles of algorithmically generated art and of Computational Aesthetic Evaluation (CAE) are assessed. An appeal is made to the more fertile conceptual ground of information civilisation – an idea developed by Professor Kun Wu – and of intercultural informational aesthetics (Capurro). The origin of Informational Aesthetics lies in Epicurus's notion of aethesis and the integration of artistic activity with ethics and the 'good life' - as in the aesthetic theory and practice of the East. The debasement of the word ‘aesthetic’ reflects the increasing alienation of beauty from imagination. The fragmentation of art now packaged as media objects in our digital world is the legacy of this alienation. The author introduces the concept of digital iconography (Panofsky, Wind, Belting) and applies it to Leonardo's 'Mona Lisa'. In conclusion, Informational Aesthetics is identified as a future discipline for the Philosophy of Information. Keywords: informational aesthetics, information civilisation, intelligent society, iconography
Institutional Appeals of an Intelligent Society

Abstract ID: IS4SI19114

Abstract Topic: International Conference on Philosophy of Information (ICPI)

Author Name: Kun Wu

Company/Organization: Xi'an Jiaotong University, Humanities and Social science School, Xi'an, Shaanxi.

Abstract Description: With the improvement of the intelligence of social development, the necessary labor time of human beings will be greatly shortened, and the rapid growth of the unemployed people will be a concentrated phenomenon of social progress. The development of an intelligent society will lead to the differentiation of new classes. The new class division will surely bring new social problems and new social coordination systems. A reasonable and new social system suitable for the future intelligent society must be a society in which social wealth is highly shared. This shared society should be based on the principle of economic distribution of Social Security + Distribution according to Work. In addition, the rational social system that the future development of an intelligent society requires is not only a shared economic system, but also a new shared social system and a new social civilization system. In this new social civilization system, the principle of sharing should not only become the basic principle of social economy, social politics and social management, but should also be the general way of social organization, social survival and social development.
Intelligence, Artificial Intelligence, and Wisdom in the Global Sustainable Information Society. Clarification of concepts

Abstract Description: The concept of the Global Sustainable Information Society sums up the necessary conditions that need to be met if the challenges to the continued existence of humanity on Earth shall be successfully tackled. Societies are seen as social systems the further development of which in times of global challenges need a transformation (metasystem transition) such that they become elements of a higher-order system that expresses a new state of human cooperation. That state would allow for keeping the self-inflicted systemic dysfunctions below a threshold that threatens with self-annihilation. Intelligence, AI and wisdom are deemed different manifestations of informational capacities. It will be argued that – intelligence is a property inherent in any self-organising system (agent), that – wisdom is the highest product of intelligence that social systems and actors share, and that – AI is a non-agential (not self-organising) extension of social systems and actors that needs to be designed so as to support wisdom, that is, to enable new synergy for social systems and actors but not constrain them and undermine their autonomy.
Abstract ID: IS45127

Intelligent Analysis Method in Safety Science——Space Fault Tree and Factor Space

Abstract Topic: Global Forum on Artificial Intelligence (GFAI)

Abstract Description: The development time of basic theory of safety science is relatively short compared with other disciplines, and the corresponding basic theory is weaker. But with the development of science and technology, more and more complex large-scale systems emerge. There are obvious differences between these systems and early systems, including complexity, factor changes, data information, system control and so on. Traditional reliability and fault analysis methods are difficult to solve. In order to solve these problems, the authors put forward the Space Fault Tree (SFT) theory to study the system reliability and fault evolution process. At present, the theory of SFT is divided into four parts: the theoretical basis of SFT, intelligent SFT, Space Fault Network, System Motion Space and System Mapping Theory. SFT is combined with the theory of factor space, cloud model, fuzzy structural element, system stability and information ecology methodology. The purpose of this study is to make the SFT theory have the ability of analyzing large fault data, reasoning fault logic relationship, studying the system fault evolution process and measuring system motion change while completing system reliability and fault analysis. In order to show the research results of space fault tree, this paper is written to briefly introduce the four major parts of space fault tree theory and its main contents and achievements.
Abstract Description: The question about conditions qualifying an object, whether artificial or natural, an entity or its functioning as intelligent is more about qualifier (intelligence) than qualified. Of course, if we had an established definition of intelligence, then we could sort objects, actions, processes accordingly. But we don't. Turing attempted to escape the problem in the context of artificial systems ("machine") using his "imitation game", but instead of closing the discussion of "intelligent machinery", he opened Pandora's box of ever-lasting disputes in which intelligence is frequently mixed with the ability to think, capacity of being conscious, etc. So whether computers or computing can be intelligent or not depends on the way we understand intelligence. When we compare the intelligence of different people, we consider as more intelligent the individuals who have the ability to comprehend and reduce complexity, usually by making complex tasks simple through the deconstruction and leaving this simple tasks to less intelligent collaborators. In case of computers (or Turing machines) we know that Turing machine cannot reduce the algorithmic complexity of the configuration on the tape, or to assess complexity. It cannot even assess computability of the input configuration. Computing is a one-way process of construction, but not deconstruction. It is a human programmer who decomposes in the process of programming the complex task into an algorithm (intelligent part of the task) and leaves the non-intelligent task of performing the construction of the desired outcome. Considering this, we can answer the question in the title: Yes, oxymoron. However, this does not mean that computing in its more general form cannot be intelligent. The question is what the necessary conditions are. The paper presents the view that it is the capacity to integrate information.
Known Knowns, Known Unknowns, Unknown Unknowns, Unknown Knowns: A case for rethinking the DIKW pyramid, hierarchy model

Abstract Topic: International Conference on Philosophy of Information (ICPI)

Author Name: Ronald Kochevar
Company/Organization: Mechanics of Spirit

Author Name: Shima Beigi
Company/Organization: Mindfulness Engineering™

Abstract Description: For the past decade we have been witnessing a dramatic shift in both socio-ecological and socio-technical arena. We are moving towards a more data driven, enabled and influenced societies as well. This dynamic ever changing ecosystem presented in 21 Century, means that we are more likely to need a road map from Known Knowns, Known Unknowns, Unknown Unknowns, to Unknown Knowns. The solutions to this transition is working together as a global community. For this level of collaboration to emerge, nevertheless, we must undergo not only a deep mental model transformation, but also a deep scientific revolution. This seed of rethinking how scientists work together was planted during 1960s. Thomas Kuhn urged the need for paradigm shift in the Structure of Science. On the same ethos and spirit, trained in both classical sciences (e.g., engineering and physical therapy) and alternative approaches to human wellbeing and health (i.e., certified leadership coaching, yoga instructor, tantra coach, alternative medicine practitioner), the authors argue that we live in an interdisciplinary age whereby cross-fertilisation of ideas and disciplines is made possible. We can solve today's grand challenges of our time, only by connecting ideas from different disciplines. We review case studies of disaster recovery, resilience building and healing from pain and complex physical injuries, and attempt to propose a case for rethinking the DIKW pyramid, hierarchy.
Language Games: Locating the Science in Artificial Intelligence

Abstract Topic: The "I" in AI, and the Meaning in Information

Abstract Description: Roger Schank once complained that taking an AI system from scientific laboratory to product required so much engineering that, by the end, the science is nowhere to be found. In this talk, I suggest that AI systems' well known tendency to lose their scientific spark when put into use points us to the way in which AI practitioners conception of "science" has tended to treat context and the processes of meaning-making as excess--as mere application--with the consequence that, without significant re-engineering, such systems inevitably fail. Tracing a history of AI language learning in simulated video game worlds from the MIT blocks world of the 1960s to a collection of high-profile contemporary efforts by Microsoft and Facebook Research, I document how statistical measures descended from the work of Claude Shannon and Warren Weaver helped to make scientific some conceptions of language while obscuring others. In particular, I argue that AI has built its models around conceptions of language that can only fully manifest under the carefully controlled conditions of the laboratory. Against this history I lay the experiences of video game designers who, responsible for producing systems with which people actually interact, find themselves of necessity creating new vocabularies of linguistic interaction with a computer system that, I contend, present a promising starting point for a reconceptualization of the scientific project of AI that recognizes their contexts of use as themselves valid sites of scientific study.
Abstract ID: IS4518698

Laws in philosophy of info-computationalism

Abstract Topic: International Conference on Philosophy of Information (ICPI)

Author Name: SHANSHAN FAN

Abstract Description: What are laws of nature? This issue has always been one of the core issues of philosophy of science. Laws of nature, faced with what Bas van Fraassen called the problem of confirmation and inference in the current philosophical discussion, are no longer taken for granted with the necessary explanation in philosophy of science. In contemporary, the info-computationalism, uses algorithms and information to explain laws of nature, and analyses its nature from the perspective and invariance, which opens up a new path for laws of nature. Therefore, this paper, based on the theory of info-computationalism, investigates various laws of computational motion in network programming and compares them to Floridi’s concept of levels of abstraction. Here, it can find that just as natural laws admit of no exceptions, when programmers prescribe laws for their abstract worlds they must make sure they admit of no variation. Although worlds are products of programmers’ creative imaginations and any “laws” in these worlds are easily broken, the worlds of computational objects need laws in the form of self-prescribed invariants and the suspension of these laws might be creative acts. It is fruitful to consider, the theory of info-computationalism emphasizes the objectivity and constructiveness of laws respectively from the perspective of ontology and epistemology. In the dual existence and evolution system of objectivity and construction, the problem of laws of nature has obtained a novel and unique interpretation scheme.
Local mathematics and number scaling provide information about physical and geometric systems

Abstract ID: IS4S138138

Abstract Topic: Theoretical Information Studies (TIS)

Author Name: Paul Benioff  

Company/Organization: Argonne national laboratory

Abstract Description: The concept of local mathematics and its use in providing information about properties of physical and geometric quantities begins with the observation that gauge theories in physics are based on local vector spaces at each point in space time. These spaces and unitary transformations between the spaces are the mathematical base for the standard model in physics. Extension to include local number structures and to structures for mathematical systems that include numbers in their description leads to local mathematics. The use of local mathematics to provide more information about the properties of physical and geometric systems is based on the distinction of number from number value. This leads to the existence of a space time dependent value or meaning field that provides value or meaning to local numbers and other types of mathematical elements used in physics and geometry. Some examples of the use of this setup to provide information that helps to explain physical and geometric properties will be given.
Lost in a forest of exponentials

Abstract Description: This is an age shaped by much more than Moore's Law - it is an age of multiplying exponentials in myriad fields from computer science to life science and beyond, each creating surprise, opportunity - and turbulence. The combined effect is a "hyper-exponential moment" defined by multiple exponential phenomena collectively cross-impacting and cross-accelerating science discovery and technological innovation. The consequence is the defining challenge of our age: the ever-growing gap between hyper-exponential acceleration and slower-moving cultural and social norms and systems. A century of discovery has left us lost in an exponential forest, distracted by our innovations and utterly unable to find our way out. The actions we take to address this in the next decade will define the shape of the next century -- and perhaps the future of humanity.
Love and Light, Rainbows and Unicorns: Meme dynamics and Spread of Superstition in Social Media

Abstract Topic: Habits and Rituals (H&R)

Author Name: Shima Beigi 1

Company/Organization: Mindfulness Engineering™

Author Name: Ronald Kochevar 2

Company/Organization: Mechanics of Spirit

Abstract Description: Digital platforms have become a fertile ground for the emergence of "digital nomads", "healers", "digital entrepreneurs" and so on. In this presentation, drawing on the latest research on the "spread of superstition", "evolutions of meme dynamic and use of hashtags", "resilience theory", and insights from Native Americans' rituals and habits aka ways and methods of communication with the unknown, we argue that our ability to create cohesion and resilience in this emerging data-driven and data-enabled future is highly dependent on our capacity to verify the large stream of data that percolates into our awareness. We propose the need for a fundamental education plan on the nature of data and information, and development of new code of ethics and behaviour (e.g., verification system) in the cyberspace.
Abstract ID : IS4513

**Mechanism Approach to AI**

**Abstract Topic** : Global Forum on Artificial Intelligence (GFAI)

**Author Name** : Yixin Zhong

**Company/Organization** : Beijing University of Posts and Telecommunications

**Abstract Description** : There have been three approaches to AI research till the present, namely structuralism approach leading to artificial neural networks, functionalism approach leading to expert systems, and behaviorism approach leading to sensor-moto systems. All the three approaches have made certain progresses in each of the three areas. On the other hand, however, the three approaches cannot synthesize into the general/universal AI theory, becoming the greatest headache in AI research. We present a new approach to AI that is the mechanism approach, becoming the fourth approach to AI research. By 'mechanism approach to AI' we mean that what one should do in AI research is to simulate the mechanism through which the intelligence can grow up. What is the mechanism for AI growing then? Based on our study, the mechanism for AI growing is a group of the information conversion, that is the conversion from object information to perceived information, the conversion from perceived information to knowledge, the conversion from perceived information to intelligent strategy, and the conversion from intelligent strategy to intelligent action. It is shown in the paper that, interestingly, the structuralism approach, the functionalism approach, and the behaviorism approach are special, and mutually harmonious, cases of the mechanism approach. As a result, different from the structuralism approach, functionalism approach, and behaviorism approach, the mechanism approach to AI leads to a universal AI theory, or a general AI theory, instead of local AI theory. This is because of the fact that the mechanism approach to AI research is an approach that masters the holistic feature of AI whereas the other three approaches are related to some local features of AI.

Abstract ID: IS4579

Abstract Topic: Global Forum on Artificial Intelligence (GFAI)

Author Name: Leiming Shi

Company/Organization: Xi’an University of Architecture and Technology

Abstract Description: the material existence in the natural world is considered their own media and language, which we named matter-language. The literal and musical signs are called media-languages. Linguistic model constructed by humans, including media-language, are model and atlas that humans built for the world that they live in. In these human language systems, meanings are not made arbitrarily, but defined by other words which are in turn defined by some others. The human languages and words have a historical edacement and causal relationship that border on evolutionism. When we take a word as a node and take the defining explanations as its connection lines, the human language system can be seen as a combination of an evolutorial network tree and a 3D reticulation. This network is similar to neural network with the nodes being words. The topology of the network has relative certainty. The explanations, logic, and causal relationship are buried in its connections. Therefore, knowledge and intelligence, constructed by human languages, are transformed into a neural network in which nodes have explicit meanings. This network can retrieve and compute. By transforming the word network into a definite topology relationship network entirely, retrieving, thinking and computing can thus be converted to sets and logic calculation with limited grammars and its logic calculation. This network also exposes the so-called meaning of things, which is their causal relationship. Therefore, taking languages as an integrated topological network, and transforming it into a topological geometry, logic and calculation, through direct inheriting and adapting human language and its causality logic and algorithm, we can obtain machine intelligence that is similar to human brain computation. We understand the world and natural languages through an integrated general language topological network structure and thus revealing the technical path and principle of CPU of new AI.
Morphological computing in cognitive systems, connecting data to intelligent agency

Abstract Description: Intelligence and cognition are closely related terms that often are mixed together. In the beginning, cognition was considered as connection between information and knowledge, without elaboration either on the processes that precede information or those which come after knowledge is constructed. This old view of cognition thus leaves bodily aspects such as feelings and emotions out of the scope of cognitive science. At the same time Artificial Intelligence (AI) was trying to reproduce human intelligent behavior in the computing machinery based on expert systems equipped with logical reasoning. Both cognition and AI have been envisaged as results of logical operations, either on the information obtained directly from the perception and stored in the memory in humans, or from data bases and online searches in the machinery. However, as the limits of GOFAI project have shown, cognition and intelligence in humans are substantially dependent on their embodiment, thus not only logical processes of reasoning, but also on their form (morphology on different levels of organization), physics and chemistry (thus details of implementation of information processing mechanisms). Studies of cognition and intelligence in other, simpler living beings, show clear connection between physical embodiment and cognition or intelligence. In this talk I would like to address the new developments of computational approaches to cognition and intelligence where body is integral part of those processes and computation is not only symbol manipulation, but also physical processes know as natural computation or morphological computation. I will highlight differences between cognitive computing and artificial intelligence and their connections to cognition and intelligence in nature.
Abstract ID:
IS4SIS2185

Morphological, Natural, Analog and Other Unconventional Forms of Computing for Cognition and Intelligence

Abstract Topic: Morphological & unconventional computing (MORCOM)

Author Name: Gordana Dodig-Crnković 1 *

Abstract Description: The questions regarding the modern information processing technology in performing tasks traditionally considered as exclusively human, or even considered as defining human being such as thinking, intelligence, consciousness, or goal-oriented agency are essentially the same questions as those asked by natural philosophers through the ages. We have now more powerful intellectual and technological tools in searching for answers, but the existing pervasive and convenient tool-kit brings also a danger of following the old habits of thinking. This is why it is necessary to re-consider and re-examine even most fundamental concepts, such as computing or cognition and intelligence. There are examples of novel studies, for instance of morphological computing and embodied cognition, that succeed in escaping the inertia of thinking habits and question conventional theoretical and practical models. In this event we bring together perspectives on morphological-, physical-, natural-, analog- and embodied cognitive computation and other forms of unconventional conceptualization of computing, cognition and intelligence.
Music time stratification in the perspective of information philosophy

Abstract Description: The stratification of music time is the initial step for the philosophical study of music time. Without forming an explicit structure of stratification, the ontology of music cannot be clearly discussed. Previous studies of music time were mostly carried out in the domain of phenomenology, hermeneutics and semiotics, which have noticed the pattern of music in the stream of consciousness in the brain. This research features the question of music time in the philosophical perspective of information. It starts from the genesis of music, including the whole process of music, from physics to psychology, from object to subject until the unity of both. Music is regarded as a kind of information, similar to music as a symbol, but it is different from the symbol in semiotics. Information reveals the mode of existence and the state of matter itself. We regard information not only as a method, but also as the existence of meta-philosophy. However, Music unveils itself through the flow of sound, the existence of changing rhythm and the subsistence of timeliness. Music conveys broader meanings as information than as a symbol. Music information exists in a timely manner. The research of music time is the necessary method to uncover the mystery of music ontology. Music time has the characteristics of multi-layer and multi-dimension. Unlike the physical time, music time exists both in physical time and in one's own internal time which one can perceive. It also lives in the reconstructed memories of people's stream of consciousness. And the three states cannot be separated, they coexist dependently, indicating themselves in the form of the unity of the three states. Music time corresponds to the three levels of information philosophy. It is a unified social information of three states: in-itself information, self-information and regenerative information.
On information, information and information

Abstract Description: Although a unifying definition of information is still out of reach, it is widely accepted that information is a tripartite phenomenon: information is something carried by signal about something for some use. With respect, information has three aspects: physical, referential and normative. I believe that the concept of information leads to many confusions and misunderstandings of information without clearly conceptual distinction between these three aspects. Therefore, the task of the presentation is to make a conceptual analysis of information and clearly define physical (Phy), referential (Ref) and normative (Nor) information. With the articulation, many disputes can be settled, confusions be clear up. For example, when we say information is an objective commodity, it refers to Phy in computer science and communication engineering and Ref in formal theories of semantic information. Phy is measurable in two sense: intrinsically and extrinsically. The quantity measured by Kolmogorov complexity is intrinsic for Phy, While Shannon's mathematical theory of communication measures Phy extrinsically. Phy is different from physical processes though realized by them. Ref should not be confused with meaning. Nor is the most slippery aspect of information. The reason is that it is used at two levels: type and token. There are stabilizing, intended and actually realized Nor.
On the nature of the Intelligence in AI

Abstract Topic: The "I" in AI, and the Meaning in Information

Abstract Description: Whether we find Intelligence in AI depends upon how we define intelligence. The variety among the weights in the graph implementing the AI is information, in Shannon's sense. We may regard information as potentiating some forms of intelligence. If there is intelligence in AI, that intelligence is found in the AI's graph. A graph consists of nodes, the arcs that connect the nodes, and anything attached to (said to ornament) the nodes, and the arcs. In an artificial neural network both the nodes and the arcs are ornamented. Each node has a mathematical function such as adding, comparing, function lookup. Each arc has a weight. To see intelligence in a graph, we use the idea of information. The information in a graph is coded into the weights. Using Shannon's quantification of information (related to surprise), we can see that a graph whose arcs all carry the same weight cannot surprise us. However, when weights are various, and we can consider any particular arc, we can discover its weight, and information is there. We can allow that intelligence, or at least behavior that simulates intelligence, is enabled by information. Neural nets 'learn' using supervised or unsupervised training. Supervised training includes presentation of an input, the correct answer, and a method of updating weights that brings the neural net's answer closer to the correct answer. Changing the weights puts information into the graph. Once the weights are established, the graph can calculate the output value corresponding to an input value and obtain a result. The result is obtained using the information in the weights. Insofar as we regard intelligence to be the application of learned knowledge to a problem, we find the intelligence there.
**Abstract Description**: Ontological foundations of the theory of discursive space (DS) are described here basing on two assumptions: of the ontological structure of the world and of the unlimited number and form of the observers of this world. This let one to derive the knowledge, its state and dynamics, which is represented by a multidimensional DS (in unlimited number) as a set of separate discourses wandering it. The ontological structure of world assumed here is based on the idea of Wittgenstein/Armstrong, interpreting the world as a set of dynamic relations between certain ad hoc parts (particulars), which are not things. Knowledge obviously is the part of this world too. Discourses play the role of particulars, whereas the systems of relations is described as multiple DS. Because DS is a representation of the world it must be complex and can be presented as a dynamical space. Language as a traditional base for discourse still remains the main form of the retention and articulation of knowledge. Natural language (universal language by Tarski) remains the key problem as an obstacle for the natural language processing (NLP). This can be solved by the hermeneutic approach, where the ambiguity, desirable and fruitful, can be represented by the various DS. This is possible on the higher level of semantics (knowledge) which the purely pragmatic and technical development of NLP lacks of. So DS complements the NLP approach. Nonetheless the holistic idea of the world and the universal idea of the observer let to generalize the idea of DS on any other semantic system. The dynamical space lets to model such a system. The possibility to formulate the general model of the knowledge opens (exceeding the qualitative and quantitative distinction). Its well described features like complexity, relativeness, variability allows to create potentially useful models based on such the space.
Open Discussion

Abstract Topic:

Author Name: Session Organizer

Abstract Description:
Abstract ID: IS4SI12

Paradigm Shift - The Way to Recover the I in AI and The Meaning in Information

Abstract Topic: General Submissions

Author Name: Yixin Zhong

Company/Organization: Beijing University of Posts and Telecommunications

Abstract Description: In Shannon information theory, the meaning of information (namely the semantic information) has been ignored. This is because of the fact that in the pure process of communication engineering, the only thing concerned is the distortion-less waveform (called syntactic information) and the meaning recovering is the task for humans not for machines. On the other hand, in the theory of artificial intelligence, the intelligence is the nucleus but yet it almost disappeared. This is because of the fact that the concepts of information and knowledge in AI, that are the resourceless of intelligence, are forms of the symbios in nature and that the inference logics employed in AI are also formal operations. In one word, the answer to the questions "where is the I in AI and the meaning in information" is that there is no I in AI and no meaning in information because of the paradigm employed is the formal sciences, refusing any subject factors. However, both information science and the theory of AI are so different from the tradition sciences that they not only should consider the objective factors like the tradition sciences but also should consider the subjective factors. Therefore, both information theory and the theory of AI not only should consider the formal factors of the objects but also should consider the meaning factors and the value factors. Otherwise, the information theory and the theory of AI will lose their significance. For successfully dealing with the studies of information science (communication as information transmission is only a simple part of information science) and the theory of AI, the step that is absolutely needed to take from now on is to change the traditional paradigm into the new one. This is the so-called "paradigm shift", or "paradigm revolution".
Abstract ID: IS4SI11178

Perfecting behaviorism: neural nets as subjects and trainers

Abstract Topic: Habits and Rituals (H&R)

Author Name: Terrence Deacon 1 *
Company/Organization: University of California, Berkeley

Abstract Description: In abstract terms the assumption of behaviorism is that an agent's behavior can be fully understood in terms of how its disposition to produce a given behavioral output is shaped by differentially reinforcing the probability of some input-output relations compared to others. Consideration of the mental and emotional correlates of this training was treated as irrelevant and even unscientific, in large part because they are unaccessible to objective observer analysis. “Training” AI systems based on complex neural network architectures using millions of input-output relations treats the the internal architecture as irrelevant because it too is largely inaccessible to generalizable analysis. In this respect such an AI system is the epitome of the behaviorist subject. But conversely, a complex neural network-based AI system fed vast amounts of behavioral data provided by tracking a person's behaviors online can become the ultimate behaviorist trainer. As this is extrapolated via increasing computing power an ever more extensive training data, it realizes both the marketer's AND the propagandist's dream: fine-grained predictive control of a subject's behavior while the subject preferentially chooses to behave this way.
Pixel Expansion and the Fundamentals of Elementary Information

Abstract ID: IS4SI69

Abstract Topic: Foundations of Information Science (FIS)

Author Name: Arved Hubler 1 *

Company/Organization: TU Chemnitz / Institute for Print and Media Technology

Abstract Description: Among the different ways to describe information, the minimalistic approach is not very popular. Gregory Bateson's statement “the elementary unit of information ... is a difference that makes a difference” [1] obviously may already deterred by its latent tautology. But with some modifications [2], such a definition of an elementary information can become useful. One interesting sample for elementary information is the pixel, the picture element initially introduced as a “display primitive” [3]. Today the pixel is widely used in different technologies as displays, printing and others to represent information. So far, the pixel has not received any special attention in the information community, though it offers various opportunities to study the information in a well-defined environment. It opens a slightly different view compared to the usual approach with alphabetic strings. This paper will analyze some basic effects related to the expansion of pixels. Technically expansion is the generation of pixel-based patterns. But from the perspective of the information theory, the expansion of pixels allows us to control the generation of composite information and look into the fundamental mechanisms in the absence of any physical interferences. By classification of the observed expansion mechanisms a characterization of different stages of information aggregation is possible. The results may contribute to the discussion of concepts as emergence, e.g. [4] and complexity, e.g. [5] and their relationship to information. [1] Bateson, Gregory: Steps to an Ecology of Mind; Ballantine New York, 4° 1978; p.453 [2] Hübler, Arved: Information — Semantic Definition or Physical Entity?; Proceedings of IS4SI Summit Gothenburg, Sweden 12-16 June 2017,1,3 [3] Fiume, Eugene L.: The Mathematical Structure of Raster Graphics, Academic Press Boston, 1989; p.2 [4] Hofkirchner, Wolfgang: Emergent Information; Word Scientific, Singapore 2013 [5] Burgin, Mark & Calude, Cristian S.: Information and Complexity; Word Scientific, Singapore 2017
Potential and Impact Information

Abstract Topic: Theoretical Information Studies (TIS)

Abstract Description: Based on the general theory of information and contemporary theoretical physics, two types of information are explicated: Potential information reflects possibility of changes (transformations), i.e., it a potential for performing information work; Impact information, or information force, performs changes (transformation) in the course of information work. In this context, it is possible to define information work or structural work as the size (amount) of structural changes (transformation) times the measure of impact information. We apply this concept to epistemic information, which changes knowledge of a system. To measure epistemic displacement, we use epistemic measures and describe an epistemic space as a network of finite sets (systems) of knowledge units defining the distance between two units equal to 1 as the first approximation to the epistemic metrics. For instance, if knowledge is represented by logical formulas of the proposition calculus, we take elementary propositions as units of knowledge. To measure displacements in an epistemic space, we observe that transformation of knowledge systems is performed by two elementary operations: addition and elimination of knowledge units. With this in mind, we determine the displacement as the number of elementary operations performed in this transformation. Assuming that the transformation is performed under the action of impact information (information force), we have to measure this force. In the case of epistemic information, it is natural to suppose that information comes to the system in the form of data. Then it is possible to measure the impact information by the size of input data, e.g., in bits or in bytes. This gives us the following mathematical formula for information work $W_I = m(II) \cdot D$ where $D$ is the epistemic displacement and $m(II)$ is the measure the impact information $II$. Examples of other measures of epistemic information are Shannon's entropy, Hartley measure, and Fisher information.
Processing information by symmetric inductive machines

Abstract Topic: Morphological & unconventional computing (MORCOM)

Author Name: Mark Burgin

Company/Organization: UCLA

Abstract Description: To reflect important properties of computers, Marcin Schroeder introduced a new model of computation - symmetric Turing machines or S-machines. In a conventional Turing machine, the head (processor) performs operations with data in the memory (tape) using a fixed system of instructions – its program. In a symmetric Turing machine, information processing goes not only from the head to the memory but also backward. On the one hand, the head (processor) performs operations with data in the memory using a fixed system of instructions – its program. On the other hand, the memory performs operations with instructions from the head (processor). It is also possible to carry out this computational approach using two types of memory – data memory and program memory - with a processor that performs operations with data based on information stored in the program memory and performs operations with the program based on information stored in the data memory. Physical computers also perform operations with their programs using special tools such as interpreters, compilers and translators. There are also program optimizers, which improve characteristics of programs transforming them. Automata that perform transformations with their programs are called reflexive Turing machines. It was proved that these machines have the same computing power as Turing machines but could be much more efficient. Using similar technique, we prove that functioning of a symmetric Turing machine can be simulated by a conventional Turing machine with three tapes and three heads. Thus, symmetric Turing machines have the same computing power as Turing machines. At the same time, we prove that symmetric Turing machines can be much more efficient than Turing machines. To achieve higher computing power, we introduce and study inductive symmetric machines, which further develop the structure and possibilities of inductive Turing machines allowing modeling natural computations in various situations.
Abstract ID: IS4519181

Product Bio: Finding the most sustainable supply chains with data science

Abstract Topic: General Submissions

Author Name: Angela Chen

Abstract Description: ProductBio is a venture-backed data science technology startup in Silicon Valley providing product category-level decision analytics for sustainable purchasing and merchandising. A revolutionary company that brings the latest in environmental and data science tools together, our team creates better purchasing compliance and selling optimization outcomes for the individual, team and organization at the product category level for buyers and sellers of foods, goods, and services. In seconds, ProductBio reads through millions of raw data sources of production and supply chain information to help institutional buyers at cities, universities and companies find goods and services based on how they were made. Discovering green, ethical, or local products so our organizations can vote with our wallets—in alignment with our values, requirements, and regulations—is thereby made easier to understand and more trustworthy. ProductBio uses AI to: 1. Provide new information about sustainability standards previously unavailable and provides this guidance as a scalable resource for producers and consumers of manufactured goods and services; and 2. Look for optimal supply chains with a novel measurement ability for evaluating information about products, pushing manufacturers to become better at offsetting impact liabilities in their product categories. By extracting meaningful data from the complex noise of supply chain production processes, we are setting the standards for which sustainability is understood and measured—perpetually moving the needle forward on sustainability and what it means.
Product of My Environment: How Social Media Companies are Taking Your Time, Your Money, and Your Self.

Abstract Topic: Hacking Societies: Surveillance, Social Media, and AI Behaviorism (H5)

Author Name: Bailey Farren 1 *

Company/Organization: UC Berkeley's Division of Data Sciences

Author Name: Luke Larson 2

Abstract Description: Many people spend their lives searching for the secret to happiness, but to scientists, happiness is no mystery. Countless studies have revealed the foundations of a fulfilling life: regular exercise, time outdoors, a strong network of friends and family. These findings have positioned social media and the forces that guide it, as diametrically opposed to our wellbeing. Netflix CEO Ted Sarandos has said that his company is competing with Star Wars, Pokemon GO and, most recently, sleep. What Netflix, new media, and social media companies are really fighting for is your time. The fight for your attention is nothing new, but this time, it's personal. This presentation will analyze the ways in which advances in AI and the rise of Big Data have allowed companies to capture your attention like never before. We will consider how websites can personalize content, test changes, and iterate their designs at incredible speed in order to manipulate your behavior and opinions. Whenever you open an app, cutting edge algorithms and some of the most powerful machine learning tools ever created are being deployed to keep you there. AI is being used to predictably influence how users spend their time, money, and lives. What are these tools, where are they being used, and how can understanding them help fight their influence?
Prolegomena to superintelligence

Abstract Topic: Global Forum on Artificial Intelligence (GFAI)

Author Name: Mark Burgin

Company/Organization: UCLA

Abstract Description: To understand superintelligence, it is necessary to understand intelligence. Understanding of some systems or phenomena in science and often in mundane life comes through creation of relevant and adequate models. In their studies of people, their mental traits and behavior, researchers elaborated different models of intelligence, which can be demarcated into three classes: attributive or trait-oriented, behavioral or task-oriented, and enigmatic or problem-oriented models of intelligence. There are also other typologies of intelligence. For a long time, researchers ascribed intelligence only to people and studied it in psychology where it has become one of the most talked about subjects. However, still there is no standard definition of what exactly constitutes intelligence. With the development of information technology, it became a focal goal to create artificial intelligence in the form of thinking machines or automata. This endeavor went into three directions: experimental studies of intelligence of people, theoretical studies of intelligence as a natural phenomenon and creating of more and more powerful information processing systems such as computers, networks and other technical devices. History of humankind and studies of psychologists demonstrate that the concept of intelligence is a relative characteristic of different systems. How we interpret this concept depends on social and natural environment and thus, it is ecologically reliant contingent. This was the main obstacle in finding an encompassing and at the same time, exact definition of intelligence. Here we develop a general theory of intelligence in such a way that ecological characteristics become parameters of the model of intelligence. For instance, Sternberg defines intelligence as "mental activity directed toward purposive adaptation to, selection, and shaping of real-world environments relevant to one’s life." This allows reorganizing the existing typologies of intelligence developed in works of different psychologists providing better theoretical tools for intelligence measurement and evaluation.
Prolegomenon to an Informational Philosophy in Reality

Abstract Topic: International Conference on Philosophy of Information (ICPI)

Author Name: Joseph Brenner
Company/Organization: International Society for Studies of Information

Author Name: Abir Igamberdiev
Company/Organization: Memorial University of Newfoundland

Abstract Description: In the acceptation of Wu Kun, the Philosophy of Information is a Metaphilosophy, incorporating informational-philosophical stances on major epistemological and ontological questions. Examples just from the contributions by Brenner to previous Philosophy of Information Conferences include personal identity; symmetry; semiotics; social competence and responsibility; and, together with Wu, the informational revolution in philosophy. The necessity of a non-standard logic of real processes in this approach was demonstrated. In this paper, Brenner and Igamberdiev analyze the dialectics as well as the non-standard logic underlying the application of Informational Philosophy. The utility of their approach is further demonstrated in the areas of meaning and semiotics, information itself and communication. A new characterization of the dynamic units of thought, hence of information processes, is suggested in advance of a planned, more detailed treatment.
Abstract ID: IS4S15126

Prolegomenon to an Informational Philosophy in Reality

Abstract Topic: International Conference on Philosophy of Information (ICPI)

Author Name: Joseph Brenner ¹ *
Company/Organization: International Society for Studies of Information

Author Name: Abir Igamberdiev ²
Company/Organization: Memorial University of Newfoundland

Abstract Description: In the acceptation of Wu Kun, the Philosophy of Information is a Metaphilosophy, incorporating informational-philosophical stances on major epistemological and ontological questions. Examples just from the contributions by Brenner to previous Philosophy of Information Conferences include personal identity; symmetry; semiotics; social competence and responsibility; and, together with Wu, the informational revolution in philosophy itself. The necessity of a non-standard logic of real processes in this approach was demonstrated. In this paper, Brenner and Igamberdiev analyze the dialectics as well as the logic underlying the application of Informational Philosophy. The utility of their approach is further demonstrated in the areas of meaning and semiotics, information itself and communication. A new characterization of the dynamic units of thought, hence of information processes, is suggested in advance of a planned, more detailed treatment.
Abstract Description: Broadly, the term ‘asexual’ refers to persons who do not experience sexual arousal or who choose not to engage in sexual behaviour. In recent years, the social and natural sciences have shown an increased interest in the study of human sexualities. Demarcating the boundaries of categories, including categories of sexualities, is an important task. The clarification of terms and categories lends itself to more careful or fine-grained theoretical research, which, in turn, can lend itself to real-world ameliorative amendments to practices and understandings of both others and ourselves. In the Western world, what Foucault terms “compulsory sexuality” coupled with the trend of “sex positivity” and its accompanying proliferation of ways to understand or identify one’s own sexuality (i.e., as “pansexual,” “demisexual,” “polyamorous,” etc.) is pervasive in academia and the lived world. While interest, both expert and otherwise, has increased with respect to non-heterosexuality, despite some exceptions, asexuality is largely overlooked. Scholarship pertaining to asexuality of moral importance since constraints and enablements are placed on individuals who are, or who are taken to be, asexual. When asexual persons are misunderstood, constraints – most often manifested by implicit and explicit everyday “normal” (read: non-aseXual) norms and rituals - placed upon them can be not only be epistemically unwarranted, but oppressive. As non-heteronormative, non-monogamous, and pro-sex movements and trends gain momentum and public support, asexuals are left by the wayside. This serves to underpin asexuality as a pathos, creating a climate, whether in the academic or in the everyday world, where allies are hard to come by on account of an epistemic harm: the notion of asexuality is not well-enough understood to be defended, questioned, or even re-evaluated.
Rationality Analysis of the Application of AI to Competitive Sports

Abstract Topic: International Conference on Philosophy of Information (ICPI)

Author Name: Feng Zhang

Abstract Description: With the rapid development of artificial intelligence (AI) in today's society, its application to the field of competitive sports is more and more extensive. However, the rationality of this application is an issue worth exploring. In this regard, it can be analyzed from the two dimensions of tool rationality and value rationality, among which tool rationality refers to the influence of AI on athletes' competitive level, and value rationality involves the influence of AI on the fairness and aesthetic enjoyment of competitions. It's true that the application of AI can effectively improve athletes' competitive level and fairness of the competition, from which perspective it makes sense that the application of AI has tool rationality and a certain degree of value rationality. However, the application of AI is a double-edged sword for the aesthetic enjoyment of the competition. On the one hand, it can improve the aesthetic enjoyment of non-intellectual sports; yet on the other hand, it may reduce the aesthetic enjoyment of some intellectual sports. From this point of view, the application of AI lacks certain value rationality.
Recent books delineating the emergent academic filed of the Study of Information

Abstract Topic: Theoretical Information Studies (TIS)

Author Name: Gordana Dodig-Crnković

Author Name: Mark Burgin

Company/Organization: UCLA

Research on innovation and reform of education in the era of artificial intelligence

Abstract Topic: Global Forum on Artificial Intelligence (GFAI)

Author Name: Juan Shen

Company/Organization: Wuhan University of technology

Abstract Description: with the development of artificial intelligence, the field of education is facing unprecedented challenges and great opportunities, how education will change, how to innovate and develop. Through combing the development of artificial intelligence, analysis the impact on the education of artificial intelligence, the research of artificial intelligence era schools, teachers, students' revolutionary change, the advent of the era of artificial intelligence on major influence and profound changes in the field of education, to have a comprehensive understanding of artificial intelligence, on this basis, to explore change the path of the education innovation, cultivating new talents to meet the requirements of artificial intelligence development.
Abstract ID: IS4SI37

**Research on innovation and reform of education in the era of artificial intelligence**

**Abstract Topic**: Global Forum on Artificial Intelligence (GFAI)

**Author Name**: Shen Juan

**Company/Organization**: Wuhan University of technology

**Abstract Description**: With the development of artificial intelligence, the field of education is facing unprecedented challenges and great opportunities, how education will change, how to innovate and develop. Through combing the development of artificial intelligence, analysis the impact on the education of artificial intelligence, the research of artificial intelligence era schools, teachers, students' revolutionary change, the advent of the era of artificial intelligence on major influence and profound changes in the field of education, to have a comprehensive understanding of artificial intelligence, on this basis, to explore change the path of the education innovation, cultivating new talents to meet the requirements of artificial intelligence development.
Research on tacit dimension of information design

Abstract Topic: International Conference on Philosophy of Information (ICPI)

Author Name: LI LUO 1*

Company/Organization: 西安建筑科技大学

Abstract Description: The core of information design is clear and effective information transmission. By sorting out complex information, structuring and visualized creative expression, it is conducive to the transmission of specific information and easy to be understood and accepted by the audience, so as to provide the audience with the design of information terminal products or services. In the design of information transmission, it includes three relations: information source (publisher), information medium (design and media) and information target (audience). In these three kinds of rights, the audience should be the first, because the audience is the first target of information transmission; Secondly, the audiences are information demanders and seekers. Third, the audience is the "feedback source" of information transmission. In information design, the decision of the information publisher is based on the information feedback from the audience or users, and the designer, media or product aims to meet the needs of the audience or users and achieve user experience. In the information in the design of the rights of the audience got fully respect, publishers, stylist is in keeping with the rights of the media, audience, information publishers first consider the audience needs, the designer and the media is thinking how to meet the needs of the audience, the audience is to demand as much as possible the information feedback to the publisher, the designer and the media, in order to obtain better products and better service. It can be said that information design is a complete cycle of information transmission and a process of continuous improvement and perfection. In this paper, the author attempts to discuss how to transform tacit knowledge into explicit concepts through interaction design, so that both expert and non-expert knowledge designers can make use of tacit knowledge to maximize the quality and quantity of knowledge transfer.
Research on the system function-structure analysis and its implicit relation with complete and incomplete information

**Abstract Description**: In order to understand the system function-structure under different background relations, two analysis methods are proposed based on space fault tree and factor space theory. They are the system function-structure minimal disjunctive formula and the system function-structure simplest formula. The former establishes the axiom system of system function-structure analysis based on factor logic, and proves that the system function-structure obtained by function-structure analysis method is a minimal disjunction formula. The latter gives a more detailed analysis steps based on the former idea, which is mainly used to determine the implicit relation between system function and component function. The background sets consisting of 16 and 32 background relations are studied for these two methods. The results show that the complete background relations can obtain a certain system function-structure uniquely; the incomplete background relations can obtain a family of certain system function-structures. If the incomplete background relations are a subset of the complete background relations, then the incomplete background relations must has a linear relation between functions to complement the incomplete background relations. At the same time, the system function equivalent and replacement relation are obtained. It is also proved that the system function-structure obtained from several subsets of the background set is the simplest and the condition required for the simplest structure of the background set is strict. At present, the above methods are mainly used for system reliability analysis in the field of safety system engineering.
Reverse Causal Analysis Method in Factor Space

Abstract Description: Many algorithms have been constructed using factor space theory, such as base point extraction algorithm, positive causal analysis method, etc. Since the rules extracted by the positive causal analysis method are incomplete, a reverse causal analysis method is proposed for this purpose. Reverse causal analysis method is based on causal branching, and analyzes the logical structure of conditional factors in each class, and then extracts more complete rules of reasoning. Factor space \( D, F = \{f_1, ..., f_n\}, g \) is conditional factor and \( g \) is result factor, a rule \( A(x) \) to \( B(y) \) is established by deleting the rows of an object in a conditional factor from the causal analysis table, which is called causal branching. Call \( A(x) \) is a branch and \( B(y) \) is a leaf. Reverse causal analysis steps are as follows: 1. Given causal analysis table. Make a causal branching for each row, and then connect branches with the same leaf to get a reverse forest by observing conditions from results. 2. Starting from the result class, the same result label reflects the relevant conditional factors that a result factor should satisfy, so that a disjunction paradigm can be formed. 3. According to the logic minimization method, a causal branching rule is obtained. Other class and so on. Reverse causal analysis method uses only a few of conditional factors to classify. It effectively distinguishes the extent to which conditional factors affect result factors. And realize the interaction between concept and reasoning. The method is simple and suitable for the application of big data.
Ritual Artifacts as Memory Stores of Cognitive Habits

Abstract Description: Ritual artifacts are produced by individuals and/or small groups and left over-there, in the environment, perceivable, sharable, and more or less available. Artifacts of this type can be considered cognitive mediators in so far as they are collective memory stores of related habits, in the sense that they mediate and make available the story of their origin and the actions related to it, which can be learnt and/or re-activated when needed. Indeed, symbolic habits embedded in rites can also be seen as memory mediators which maximize abducibility, that is human capacity to guess hypotheses, because they maximize recoverability of already stored cognitive contents. In sum, once suitable representations are externalized in a ritual artifact, they can be sensorially picked up and manipulated to re-internalize them, when humans attend the rite: the externalization can be seen as the fruit of the so-called "disembodiment of the mind" as a significant cognitive perspective able to show some basic features of what I called manipulative abduction, that I will describe in my presentation. When analyzing artifacts and habits in ritual settings it is important to remember that also interesting cases of creative meaning formation are at play. Actually we can distinguish two kinds of habits that are at play in rites: (a) a knowledge-based kind of habit, for the analysis of which the concept of "affordance" is useful, which also plays a pivotal role in the justification of the agent's own beliefs; and (b) an ignorance-based kind of habit, which will be proved as necessary for the beginning of thought, and which is at the base of the ampliative abductive reasoning.
S-shape transconsistent logic system

Abstract Topic: International Conference on Philosophy of Information (ICPI)

Author Name: ZHANG Jincheng

Company/Organization: Guangde 101 college entrance examination tutorial school

Abstract Description: The paper will prove that the propositions proved by diagonal methods are propositions out of domain (extra-field term). The unclouseness of mathematical calculus is an extensive and profound mathematical phenomenon, which is root of contradictions and paradoxes; while the "diagonal proof method" is just an unclosed proof method, therefore uncloseness of logical thinking calculus is found, and then transconsistent logic system S-L and S-K, "S-shape transconsistent logic" for short is established. Based on "S-shape transconsistent logic", we find set theory and recursion theory as well as a large group of extra-field term mathematic propositions in mathematical logic field. It can be proved that: Gōdel undecidable proposition is an extra-field term, real numbers constructed with Cantor's diagonal method are extra-terms; what's more, undecidable Turning in Turning halt problem is an extra-field term too. The essence of "diagonal proof method" is the proof method of constructing paradoxes, while paradoxes are used to mathematic proofs with "reduction to absurdity", which may result in errors; if it is a wrong logic method, it is not a normal error but the error of the method which will lead to error of a proposition group. Thus the diagonal method and "reduction to absurdity" will spread to specific mathematics field which will involves in philosophy, mathematical logics, computer, function theory, measure theory and specific mathematics these fields; Therefore, paradoxes and "diagonal proof method" which need to be further studied and discussed should draw our adequate attention.
Abstract Topic: Future of the Global InfoSphere (FGIS)

Author Name: Bergur Ebbi

Abstract Description: In his talk, Bergur Ebbi explores the human condition in the digital world of today and the future. Is it harder to live when everything you do or say is rated and priced? Why does the world continue despite mad cow disease, the Y2K bug, Brexit and Trump? What does the modern person really fear? Is it not fire and destruction but rather the fact that from now on all thoughts will forever remain? Bergur Ebbi is an Icelandic writer of poetry, plays and analysis. Along side his books he has written, performed and produced work for stage, radio and television and given social commentary in columns and as a stand up comic. Bergur Ebbi, originally a lawyer also holds a degree in future studies and gives talks and produces works of strategy and futures thinking. His main themes are personal identity, technology, history of ideas, fashion and zeitgeist. Screen Shot is based on Ebbi's upcoming book, Screen Shot, and his previous work, Room Temperature, published in Iceland in 2017.
Semantic Information G Theory with Formulas for Falsification and Confirmation

Abstract Description: The semantic information G theory is a natural generalization of Shannon's information theory. Replacing yj in log(.) of Shannon's Mutual Information (MI) formula with θj, a fuzzy set or predictive model, we obtain the predictive MI formula. Using truth functions to produce likelihood functions, we have the semantic MI formula. We can also obtain this formula via improving Carnap and Bar-Hillel's semantic information formula Ij=log[1/T(yj)], where T(yj) is the logical probability of hypothesis yj. The improved formula is Ijk=log[T(yj|xi)/T(yj)]=log[P(xi|θj)/P(xi)], where xi is an instance, T(yj|xi)=T(θj|xi) is the fuzzy truth value of proposition yj(xi), and T(yj) is the average of T(yj|x). Using a Gaussian function without coefficient as the truth function, we can find that log[T(yj|xi)] indicates deviation and testability. According to this formula, the larger the deviation is, the less information there is; the less the logical probability is, the larger the absolute value of information is; wrong hypotheses will convey negative information; and the information conveyed by a tautology is zero. Hence, this formula accords with Popper's thought about hypothesis-testing and falsification. To average Ijk, we have the Generalized Kullback-Leibker Formula (GKLF) and the semantic MI formula. We can use the GKLF and sampling distributions to optimize likelihood functions and truth functions for machine learning and induction. A hypothesis yj with degree of belief b is treated as the mixture of yj and a tautology with truth function: bT(yj|xi)+1-b. Using a sampling distribution to optimize b, we can obtain confirmation measure b*=[P(H|E)-P(H|E')]/max{P(H|E),P(H|E')}=[CL-CL']/max{CL,CL'}, where H=yj, E and E' are positive and negative instances respectively, CL is confidence level, and CL'=1-CL. The b* has HS symmetry suggested by Eells and Fitelson. It ensures that decreasing negative examples is more important than increasing positive examples, and hence is compatible with Popper's falsification thought. References: https://arxiv.org/abs/1809.01577
Abstract Description: This paper investigates how a social ontology of birth emerges when individuals and social groups from different locations around the world utilize technology to promote the use of religious, secular, and re-sacralized imagery in preparation for birth as a rite of passage. In particular, the paper looks at how these participants are sharing religious and nonreligious imagery related to birth through websites, social media, multimedia exhibitions, video, and other formats, examining how the imagery is used to visualize the actual physiological process of birth, as well as to mark the rite as sacred before and after a child is born. Contemporary artists are also creating new work about birth in which they represent the event as a divine or sacred act in itself. The artwork, shared through virtual and actual exhibits, has become a material conduit connecting people in a trans-religious and transnational way to a shared understanding that birth is a sacred event. In many cases, technology is bringing people from different religious and nonreligious backgrounds together as they approach and undergo the rituals of birth, as well as in how they decide to use religious objects for visualization purposes in the twenty-first century. While John Searle's theory of social ontology is utilized in mapping out the ontological transformations discussed, the paper also considers an interesting problem that arises in Searle's philosophy of mind (intimately connected to his theory of social ontology) when visualization is used during the rituals of birth. Searle contends that mental content can never in itself be an object and is an ontologically subjective element of human experience. When objects are used for visualization purposes during birth or in preparation for the event, however, the ontological status of the mental content is neither objective nor subjective but somewhere in between.
Abstract Description: Narrative has been variously described as the emergent product of two interacting memory systems (Terrence Deacon and Tyrone Cashman), as a defining feature of consciousness (Julian Jaynes), as constitutive of the human relationship with time (Hayden White), and as a rhetorical technique distant from factual truth and scientific explanation (Stephen Jay Gould). Moreover, in many semiotic or language theories, narrative remains under- or vaguely theorized. This paper proposes that narrative is a crucial aspect of information transfer in semiotic systems. To describe its role in semiosis, I begin with the concept of “hyperindexicality,” coined by musicologist Gary Tomlinson to characterize the non-symbolic systematicity of music. However, hyperindexicality can offer a new theoretical frame for narrative as well as music. Narrative is hyperindexical in that it systematizes the temporal dynamics at play within language in ways that are important for (but not identical with) the overall symbolic activity of language. I finish the paper connecting the concept of hyperindexicality to the older theoretical distinction between narrative and language developed by JRR Tolkien, the celebrated fantasist, in his essay “On Fairy Stories.” In storytelling, semiotics and literary theory may rediscover unexpected common ground.
Structural Machines as Unconventional Knowledge Processors

Abstract Topic: Morphological & unconventional computing (MORCOM)

Abstract Description: Knowledge systems often have very sophisticated structures. For instance, representation of knowledge in the form of a text involves structures of this text. Their structure is represented by hypertexts, which are networks (sometimes very complex ones) consisting of linguistic objects, such as words, phrases and sentences, with diverse links connecting these objects. Coming to multimedia, we encounter even more multifarious structures. At the same time, computational machines and automata are mostly oriented at sequential processing of information. For instance, Turing machines process words letter by letter. Thus, to work with knowledge using Turing machines, it is necessary in advance to present knowledge by linear structures. To improve efficiency and allow processing not only symbols but also links between them, more advanced automata, such as Kolmogorov algorithms storage modification machines and relational machines. However, all these relations define only structures of the first order while knowledge structure can have much higher orders. To eliminate this restriction and further advance efficiency, structural machines were introduced. Here, we present knowledge processing by structural machines. Knowledge contains information as matter contains energy and structural machines work with knowledge structures of arbitrary order transforming not only elements of these structures or the content of these elements, as conventional models of computation do, but also relations of different orders in the processed structures. This allows achieving higher flexibility and efficiency in comparison with regular models of computation including both conventional and unconventional computing systems. Structural machines can also simulate such advanced computational models as Kolmogorov algorithms, limit Turing machines, storage modification machines, relational machines and other models of computation. Being structurally universal abstract automata, structural machines work directly with knowledge structures, molecular and atomic structures, with structures studied and utilized in the topological quantum field theory (TQFT) and with structures of quantum information such as qubits.
Abstract Description: With the continuous maturity of science and technology, intelligent technology has become an important technology in today's social development. Nowadays, it has been widely used in all walks of life and plays an irreplaceable role. Intelligent society is the product of contemporary scientific and technological revolution and it is a creative society beyond reality. As breakthrough of human survival way, the future intelligent society gives our survival development to bring infinite opportunities and prospects. However, in order to provide a more transcendental, open and creative intelligent environment, there are a lot of challenging problems that need to be solve urgently. Intelligent society makes individual survival viability face the danger of degradation, making human survival experiences and feelings face many psychological troubles, bringing human survival environment face new problems. Therefore, this paper studies the positive and negative effects of the future intelligent society and puts forward reasonable countermeasures to eliminate the possible crime and disorder in the intelligent society from the perspective of morality and the rule of law. Intelligent society has brought problems and challenges for people's survival in this digital era, but, as Negroponte said that “Digital survival indeed gives us optimism. We can't deny the existence of the digital age and stop the progress of digital age, just like we can't fight the power of nature.” Modern revolution of science and technology and the development of Intelligent society provide us with the existence of multiple choices for the future, but unless we are able to correctly understand their nature and change, grasping their trends, and seizing the opportunity, every one of us can make reasonable choice, successfully realizing the self transcendence.
Taking the perspective of the Third. A contribution to the origins of systems thinking

Abstract Topic: General Submissions

Author Name: Wolfgang Hofkirchner ¹ *
Company/Organization: is4si

Abstract Description: Systems thinking is thinking in hierarchies, which means there are at least two levels (the level of the elements and their interaction and the level of the organisational relations of the system) and from one level to the next there is a qualitative leap. This qualitative leap has to do with the emergence of the (state of the) higher level from the (state of the) lower one – the lower builds a necessary condition but is not sufficient to yield the higher one, the higher one cannot be reduced to the lower one. Epistemologically, a true generalisation is thinking in hierarchies. You have an object level on which different elements appear in their diversity and you have a meta-level on which the unity of the elements appears because of the system's relations. The latter appearance is an emergent of the human cognition process, which cannot be represented by deductive reasoning. A true generalisation is an act of leaping from empirical date to a theoretical insight. It shall be argued that this capacity of human individuals was enabled by a new step of social co-operation – the advent of true social systems (societies) in anthropo(socio)genesis in which dyadic social systems (interaction of individuals that know each other) began to become nested in triadic social systems (interaction of individuals that need not to know each other). At this stage of evolution of humanity, the interaction of individuals is mediated via social relations as a Third. These social relations (culture, morals) allow individuals to distance themselves from society and to take the perspective of the whole of society and, thus, to understand what society expects from her and what she can expect from another individual.
Abstract ID: IS4SI16180

Teilhard de Chardin's Noosphere as a Great Leap in Being

Abstract Topic: Future of the Global InfoSphere (FGIS)

Author Name: Brian Thomas Swimme

Company/Organization: California Institute of Integral Studies

Abstract Description: It is time to ask such large questions as, How is it that Homo sapiens became a planet-wrecking force? When humans invented symbols enabling the storage of learning in external memory systems, they gave birth to a Lamarckian species that grew in intelligence for 200,000 years. The natural selection dynamics that had maintained the integrity of the planetary systems of life were suddenly impotent, for no other species could compete. Terrence Deacon has remarked that because of this capacity it is more accurate to think of Homo sapiens as an entirely new phylum. We can summarize the situation by saying that though our species developed into a planetary force, we proceeded as if we were just another primate species. A second question we need to ask is, How can a change in our processing of information transform Homo sapiens into a life-generating presence? One fertile suggestion comes from Pierre Teilhard de Chardin who saw humanity as constructing the noosphere, an envelope of thought around the planet. At the present time, the survival and well-being of every species on Earth depends on its relationship with the noosphere. A major step in evolution will come about when we develop the mathematics for the next generation of AI codes. At present, the foundation for our coding is still at the level of a primate species: "acquire free energy and multiply." We need a planetary AI founded in the mathematics of complex systems and governed by a new principle: "Record data and identify pathways for the enhancement of the systems of life." [Bio: Brian Thomas Swimme is co-author with Thomas Berry of the Universe Story and is professor of cosmology at the California Institute of Integral Studies in San Francisco.]
Abstract ID:
IS4SI99153

Teilhard’s Vision of a Global Consciousness: Notes on the Noosphere

Abstract Topic: Future of the Global InfoSphere (FGIS)

Author Name: Ed Tywoniak *

Company/Organization: Saint Mary’s College of California

Abstract Description: Marshall McLuhan predicted in 1964 that we, as a species, were approaching the “final phase of the extensions of man – the technological simulation of consciousness, when the creative process of knowing will be collectively and corporately extended to the whole of human society ...” (p. 3). McLuhan’s prophetic words frame many of the key questions being asked at this mini-conference, and throughout the IS4SI conference in general, including: (1) What are the effects on human cognition and social interaction caused by the explosive increase in information flow and interconnectedness between people and machines? and (2) Could an emerging IT-based global infosphere that linked human cognition with AI create a global pan human “noosphere” to use the language of the late Teilhard de Chardin, and how might a noosphere be different from a superorganism or global mind? These questions, and others, were a part of a recent research project investigating the feasibility of an evolving global consciousness. This paper provides some findings from that inquiry including some effects of living in the digital world on people’s attitudes and emotional well being. This paper will also proffer some insights and possibilities pertaining to the intersection of human and machine intelligence; with one such perspective focusing on whether or not such an evolutionary development as a global brain could be considered having a direction, and if so, can such a direction be guided by human interaction.

Abstract Topic: International Conference on Philosophy of Information (ICPI)

Author Name: Raffaella Giovagnoli 1 *

Company/Organization: Pontifical Lateran University

Abstract Description: We'll move from the debate on "testimony" in the field of social epistemology and we'll introduce the importance to discuss this notion in the ambit of communitarian epistemology (Melbourne, Hardwig, Kusch, Brandom). According to Kusch, knowledge is a matter of consensus and this theoretical option characterizes his communitarianism. Differently, Brandom does not refer to knowledge by agreement and Kusch criticized his perspective, because he thinks that a We-perspective is prior to an "I-Thou perspective". It exists a structure of the concepts we learn to use by using language. Following Sellars, we can refer the metaphor of the "space of reasons", but he understands it as a "social concept", i.e. as the space of the intersubjective justification of our assertions. Assertions possess a content that is inferentially structured. This option entails material inferential commitments we come to know in the process of language acquisition. Moreover, from the point of view of social epistemology, beliefs, mental states, attitudes and actions possess a content because of the role they play in social "normative practices". This content must be recognized by the agents in communication and action.
Abstract ID: IS4SI19176

THE "SOCIOTYPE" IN THE INFORMATION ERA: How Homo loquens fares in the Fourth Industrial Revolution

Abstract Topic: Future of the Global InfoSphere (FGIS)

Author Name: Pedro Marijuan 1 *

Company/Organization: Aragon Institute of Health Science (IACS)

Abstract Description: Conceived along the genotype-phenotype-sociotype conceptual triad, the sociotype means the adaptive nature of our sociality, the relative constancy or similar fabric of the social world in which each individual life is developed. There seems to be an average of social networking, with very ample upper and lower limits, concerning the number and types of bonding relationships that an individual is able to maintain meaningfully. Actually, the sociotype's structure basically revolves around two primary questions: With whom do we talk? and, How much are we talking? Social bonds and conversation times functionally correspond to each other and their respective data show very interesting properties and regularities, particularly in their mutual interaction. Although a number of studies have been devoted to social networks, very few –if any– have investigated how social bonds' creation and maintenance correlate with conversation times. In that respect, the Planckian Distribution Equation has been applied to empirical data on this "quantitative sociotype". Age, gender, personality, occupation, social class, local culture, etc. are individual and supraindividual factors strongly influencing the sociotype; but the means of communication, media, and entertainment of each epoch become further formidable modifiers. Analyzing historical variations of the sociotype in those "revolutionary" epochs when, apparently, everything changes around the communication structures of homo loquens becomes an intriguing exercise. [Independent Scholar, affiliated to Bioinformation Group Aragon Institute of Health Science (IACS), 50009 Zaragoza, Spain pcmarijuan.iacs@aragon.es]
Abstract ID: IS4S16189

The AI Impact Assessment

Abstract Topic: Global Forum on Artificial Intelligence (GFAI)

Author Name: Stefan Leijnen

Company/Organization: Asimov Institute for Machine Creativity and Constraint

Abstract Description: The public debate around AI has developed rapidly. Apart from the potential benefits of AI, there is a fast growing focus on threats and risks - transparency, privacy, autonomy, cybersecurity, among other - requiring a careful approach. Mapping and addressing the impact of AI in advance helps to achieve a smooth and responsible introduction of AI in society. The AI Impact Assessment (AIIA) helps to answer this question and is a guide in finding the right framework of standards and deciding on the relevant trade-offs. The AIIA offers concrete steps to help understand the relevant legal and ethical standards and considerations when making decisions on the use of AI applications. AIIA also offers a framework to engage in a dialogue with stakeholders in and outside an organisation. This way, the AIIA facilitates the debate about the deployment of AI.
The Barrier of Meaning

Abstract Description: In 1986, the mathematician and philosopher Gian-Carlo Rota wrote, "I wonder whether or when artificial intelligence will ever crash the barrier of meaning." Here, the phrase "barrier of meaning" refers to a belief about humans versus machines: humans are able to "actually understand" the situations they encounter, whereas AI systems (at least current ones) do not possess such understanding. The internal representations learned by (or programmed into) AI systems do not capture the rich "meanings" that humans bring to bear in perception, language, and reasoning. In this talk I will assess the state of the art of artificial intelligence in several domains, and describe some of the current limitations and vulnerabilities, which can be accounted for by a lack of true understanding of the domains these systems work in. I will explore the following questions: (1) To be reliable in human domains, what do AI systems actually need to "understand"? (2) Which domains require human-like understanding? And (3) What does such understanding entail?
The brain that interprets itself: neurometabolic coupling reveals what's significant

Abstract Description: The central dogma of cognitive neuroscience is that neural activity reflects information processing. It remains unknown how neural information processing can explain the emergence of normative properties, including significance, meaning and purpose. How does the brain "self-interprets" neural information? Computational models have been criticized as appealing to a "homunculus fallacy," where a hierarchical arrangement of neural modules leads to an infinite regress. Computational approaches often ignore the physical and energetic (metabolic) basis of information processing in biological systems. We propose an active role for metabolism in neural function and hypothesize that coupling between neural and metabolic signals contributes to the emergence of normative properties. In a preliminary investigation, we used lagged correlation to assess simultaneous measures of neural (electroencephalography, EEG) and metabolic activity (functional magnetic resonance imaging, fMRI) in human subjects. We find evidence for reciprocal signaling between neural and metabolic activity. Neural signals lead metabolic activity in brain regions relevant to the experimental context, whereas metabolic activity leads neural signals in the default mode network (DMN), implicated in the neurobiological representation of self. Notably, we find excessive neurometabolic coupling in the DMN of patients with schizophrenia. We consider that the process of interpretation is characterized by an entanglement between extrinsic signaling dynamics (eg. neural signal) and intrinsic dynamics (eg. metabolic activity) that maintain extrinsic signal responsiveness. We propose that the spatiotemporal pattern of neurometabolic coupling reflects the interpretive work done by the brain to determine the significance of information. Activity in the DMN may indicate a metabolic habit to interpret neural information self-referentially. Normative properties reflect an entanglement between neural representations of self and the embodied, metabolic self, with exaggerated attribution of self-significance in schizophrenia. In contrast, AI lacks normative properties due to a lack of energetic entanglement with information processing.
The Comprehensive Nature and the New Evolution of Human Beings

Abstract Description: After entering the 21st century, the development of the human information society has entered a new stage of intelligent development. We believe that with the increase of the intelligence of social development, the necessary reduction of human labor time will be an irreversible inevitable trend, and the resulting rapid growth of the unemployed people is the concentrated expression of social progress. Correspondingly, the relevant theories and doctrines that are traditionally embodied in the nature of productive labor should also be rethought. Thus this thesis mainly discusses the following five topics. First, human nature is specific, relative and developmental. Second, labor is historical, specific and developmental. Third, the return of labor and the liberation of man. Fourth, comprehensive display of intelligence and human nature. Fifth, a new way of human evolution. Based on the discussion in this article, we can make the following conclusions: the combination of future artificial intelligence and human augmented bioengineering technology will highlight new ways of human development. In the face of future development, the primary task of mankind is to establish a reasonable social system avoiding war and stopping fighting and establish a shared economy and shared society, and let humanity truly enter a new era of freedom and consciousness to create the future. If human beings can work together to design and implement a highly shared and new social system that adapts to the future intelligent development, then the comprehensive development of intelligence will bring a paradise to mankind. On the other hand, if you still stick to the traditional social system, then what is caused is a hell.
The Definitions of Information Science in China

Abstract Topic: International Conference on Philosophy of Information (ICPI)

Abstract Description: This paper collected 128 pieces of information science definitions circulating in China from the three kinds of sources. Through counting the word frequency and generating the word cloud map of the 128 pieces definitions, the high frequency words in the definition of information science and the scholars' understanding of information science are analyzed. Through the analysis of the characteristics of 128 pieces of information science, this paper summarizes the four basic patterns and three compound patterns of information science definition, and analyzes the connotation and development characteristics of the definition of information science in China.
The Development of Cognitive Science and Philosophy of Information——From Anthropocentrism to Naturalism

Abstract Topic: International Conference on Philosophy of Information (ICPI)

Author Name: Zhensong WANG 1 *
Company/Organization: Xi’an Jiaotong University

Abstract Description: The emergence of Floridi's philosophy of information has been directly pushed by the emergence of classical cognitive science and it attempts to provide us with a computational and representational epistemology and ontology. They share some common points: 1. Anthropocentrism on cognition; 2. Cartesianism on knowledge; 3. Nativism on semantics; 4. Methodology on computationalism-representationalism. But the development of cognitive science is diverging from Floridi's PI, as the core concept of representation has been gradually abandoned in more and more cognitive studies, corresponding to the movement of situated, embodied, embedded and dynamic study in cognitive science. While some philosophers started their study on naturalization of intentionality, mental representation has been facing a fate of being dispelled. Their research program has been called the "naturalization of information" by Floridi. Following such a naturalized study on information, there is Aristotelian view on the development of PI is going be discussed here, which is different from Floridi's Platonic PI. Just like the Aristotelian doctrine of hylomorphism, while "hylo" means "matter" and "morphi" means "form", information exists depending on matter. This Aristotelian view presents an account in which information can be naturalized, and it exists ontologically. And cognition happens only in the information world. Let me call it a naturalistic approach in philosophy of information. This naturalized study on philosophy of information is advocated by Wu. While Floridi builds PI as a top-down constructive informational world, Wu believes that the informational world evolves bottom-up. Wu also proposes that the information can be reduced to natural world (but not to material world), while Floridi believes information is non-reducible. And mind exists in a higher level of information activity, while the objective and omnipresent information owns a Gricean natural meaning. It is in this sense that I include Wu among the naturalists.
The difference and identity in the information of piano performance

Abstract ID: IS4517794

Abstract Topic: International Conference on Philosophy of Information (ICPI)

Author Name: Xiaolong Yang

Company/Organization: Xi'an Jiaotong University

Abstract Description: As an information philosophy with a high degree of meta-philosophy, we have learned about a world of dual existence. Piano performance as an information phenomenon is obviously a kind of operation and creation of social information. People often only indulge in beautiful music, but rarely think about and ask questions. What is the essence of music (playing)? What does piano performance mean? How do we hear the performance information? Using information philosophy about people The theory of progressive construction of information activity level can reveal the following stages: the creator converts the various types of sounds that have been touched before, including the assimilation and alienation of other people's performance information to the "subjective presentation" of information state; The identification of the perceptual information of various types of sounds establishes the information coding of the temporary connection; the subject subjectively transforms the memory storage of the information and re-decomposes the combination, and then creates the subject of the performance information; further judgment, reasoning and logical deduction to the "external object" "Transformation into purpose, planning information; controlled by the main idea to produce behavioral instructions to act on the object through finger movement, thus achieving the artistic practice process of subject information creation.
The Doubling of the Degrees of Freedom in Quantum Dissipative Systems, and the Semantic Information Notion and Measure in Biosemiotics

Abstract Topic: Theoretical Information Studies (TIS)

Author Name: Gianfranco Basti

Company/Organization: Lateran University

Abstract Description: In the context of the actual development of Category Theory as a promising metalanguage of pure and applied logic and mathematics, it is emphasized by many authors the role of the category of coalgebras, with the characterizing notions of “coproducts” (sums) and “colimits”. We use coalgebras for modeling QFT dissipative systems of condensed matter physics in far-from-equilibrium conditions, and the notion and measure of “semantic information”, based on Wigner’s quasi-probabilities, with an immediate application to the “theory of signaling” (epigenetics) in biosemiotics. Effectively, the coalgebras here used are characterized by non-commutative coproducts because they represent system states and thermal bath states, e.g., for calculating the total energy of a quantum state. This implies the doubling of the degrees of freedom (DDF), the doubling of the state space, and finally the doubling of the representational Hilbert space, where each pair, because sharing the same norm, effectively satisfies the unitarity condition. This establishes a constructive relation with Haag’s and Goldstone’s theorems in QFT, which, through the mechanism of the “spontaneous symmetry breaking” of the quantum vacuum (QV) at its ground state, and the related existence of Nambu-Goldstone “long-range correlation modes”, allow the existence of infinitely many unitarily inequivalent representations of the canonical commutation relations – i.e., unitarily inequivalent Hilbert spaces of the system dynamics. The DDF allows then to use the minimum free energy function and measure (maximum entropy) as an intrinsic dynamical tool of choice among states, so to grant a dynamic determination of the orthonormal bases of the related Hilbert spaces. It introduces at the same time the notion of the “QV foliation”, as a robust principle of “construction” and of “memory” used by nature for generating ever more complex systems, giving the notion and measure of semantic information a strong physical foundation.
The earthDECKS Learning Engine: A Hybrid Human-AI System for Impact Tracking

Abstract Description: Debates about how long industrialized civilization has to address climate change, systemic pollution, and other complex systems problems forestall the greater question: What methods can we use to start addressing global challenges that we continue to exacerbate? Rather like the spark that originated life, a promising method must be conceived such that a small start has capacity to replicate, mutate, adapt to contextual demands, and evolve. As a starter method that can grow into a global collaborative problem-solving system, we propose a distributed collaborative intelligence network powered by a hybrid human-AI framework: the earthDECKS Learning Engine with tokenization via a complementary currency system tied to impact tracking. This platform combines human collaborative intelligence with reasoning, inference and clustering mechanisms, enabled by an AI-monitored token reward system to incentivize user behavior toward positive real-world eco-social action.
The earthDECKS Learning Engine: A Hybrid Human-AI System for Impact Tracking

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The Enlightenment of Merleau-Ponty's Body Phenomenology on the Development of Intelligent Society

Abstract Topic: International Conference on Philosophy of Information (ICPI)

Author Name: Wenjing Yuan 1*

Abstract Description: The traditional cognitive theory in the intelligent society are mainly explained and guided by disembodied cognitive theory such as cognitive symbolism and the connectionism, which are divided into body and mind. The both theories advocate disembodied and out of situation. From the perspective of disembodied cognition, the development of intelligence has encountered philosophy difficulties such as Chinese Room Argument and The Symbolic grounding problem. Therefore, the embodied cognition is becoming a new theoretic paradigm to guide intelligence activities. The epistemological turn and its development in modern philosophy is the philosophical background of the rise of embodied cognition. Specially, embodied cognition is the critique to the Cartesianism epistemology of subject-object dichotomy thinking mode, and influenced actively by the epistemology of phenomenology. Embodied cognition is closely related to the factors about body, situation and others. The French body philosopher Merleau-Ponty proposed a very rich body phenomenology thoughts, such as body structure, body field, perception field, practice field, body intention and so on, which provided a philosophical basis for the embodied cognition theory, and he also pointed out a future direction and possible horizon for the development intelligent society.
The ethical Challenge of Artificial intelligence: Emotion, Belief and Virtue

Abstract Description: With the development of the modern computer technologies and mathematic algorithms, the learning and imitating abilities of artificial intelligence have been significantly improved. However, those superficial benefits are very likely to trigger new ethical conflicts, which have gradually become an urgent problem in machine and human relationships. To make artificial intelligence be compatible with human emotions, beliefs and virtues, it needs to meet two prerequisites; i) It has to have the similar or comparable abilities like a real human being to learn, think, and apply new knowledge in any different fields; ii) During the learning processes or based on already learned knowledge, it has to have the same or equivalent abilities to gain real-life experiences and ethical judgments. Therefore, a trinity relationship will be yielded between human being and artificial intelligence objects, which include the emotional dependences, responsibilities and beliefs, and virtue decision-makings. At the end, it will be a great enhancement for human being not only in pursuing better life but also in solving ethical dilemmas.
The Ethical Risk Change of News Communication under the Participation of Artificial Intelligence

Abstract Description: The development of the Internet and artificial intelligence technology has enabled machines to participate in the spiritual activities of human beings. Machines participate in the physical activities of human society and the spiritual activities of human society. Some of the activities that require human brain work are gradually transferred to the machine. There is a growing trend in the field of news communication. The involvement of artificial intelligence in news dissemination has become a new methodology for journalism research. Before the emergence of machine writing, the main body of news communication activities is people. One has its own world outlook and values, forming a unique consciousness structure belonging to individuals. Engage in news activities by using cognitive abilities and cognitive methods that match their own unique ideology. The object of news communication is also human, and it also has its own unique structure of consciousness. It receives information from activities in news dissemination with its cognitive ability and cognitive methods that match itself. After the emergence of the machine manuscript, the process of news communication activities from the subject person to the object person expands into the activity process between people, people and machines, machines and people, machines and machines. In the news communication activities, the intelligent machine plays four aspects of the ethical risk conversion of news communication involving all the roles of subject, intermediary and object. It is precisely because in the news communication activities, the artificial intelligence machine occupies all the roles of the subject, the object, and the intermediary, and the ethical risk of news communication has changed.
The form of communication or the communication of form

Abstract Description: Information is the fundamental law of creation and of living beings. Information is giving/taking shape of human being, animals and plants, as well as matter and energy of Universe. The opposite of this “law of laws” is de-formation. The process of “trans-in(de)-form-action” is the basis of the natural and human activity. This complex word means: action forming (creation) or deforming (destruction) form, which, occurring through the space-time of existence, transforms itself continuously. Information is part of a triad together with signification (preceding it) and communication (following it). No natural/human science can do without it, even if it needs to be specified in that particular “field of form”. It is possible to define four categories of in(de)-formation: • eco-biological; • thermodynamic or natural; • mathematical or cybernetic; • semiotic-semantic. The value of form, or the form of value, constitutes the information-value theory of the New economics in which the Factory-market system is not only a productive/commercial context, but and above all an internal (in the company) and external (in the market) interaction/communication: therefore, the market is not the place where supply and demand are performed, but the place of the “narrative interaction of the economic signs”. Furthermore: the economic interaction-communication performed by means of the science of value and valuation makes use, for better, of monetary-financial neg-entropy, and suffers, for worse, from the monetary-financial entropy (Rizzo). In a general-quantum sense, nature, or society, presents a multitude of phenomena apparently chaotic until they are considered as evaluative, meaningful and behavioural/cognitive messages to be understood. As a consequence, with a freely chosen interpretative code, they have a meaning within a certain background noise; with another code the noise becomes message, the message becomes noise.
The Information Development Process of Wintersweet, Orchid, Bamboo and Chrysanthemum in Chinese Traditional Painting from the Perspective of Information Philosophy, Also on the Selection of Chinese Traditional Painting Materials

Abstract Description: The selection of Chinese traditional painting materials is often accompanied by other meanings given by people, and the process of giving meaning is the process of information development. Wintersweet, orchid, bamboo and chrysanthemum, from its own form, to the observation of people, and then to people to give them special meaning, wintersweet means being proud like snow and decent people; orchid means fragrance from deep valley like virtuous people in the world; bamboo means being elegant and beautiful like a modest and gentle man; chrysanthemum means being frosty like a hermit outside the world. This development process is dealing with the development of free information, self-contained information, and regenerative information. In the traditional Chinese painting, the artist emphasizes that the wintersweet, orchid, bamboo and chrysanthemum expressed by his spirit is the social information of the three states of free information, self-contained information, and regenerative information. The selection of Chinese traditional painting materials has all gone through this same process.
The Information Ecological Dilemma of Postmodernity Society and Its Reflection on Practice Ethics

Abstract Topic: International Conference on Philosophy of Information (ICPI)

Author Name: Wang Xin

Company/Organization: Shaanxi Normal University

Abstract Description: Since the 21st century, with the development of global cloud computing, Internet of Things and mobile Internet, human society has entered the era of "big data". While big data technology brings positive changes to human society, and it also brings ethical problems such as the accelerated spread of information alienation, the disappearance of the personal data rights boundary, the wanton infringement of information privacy and the ever-expanding digital divide. There are many reasons for the absence of network information ethics in the era of big data. Generally speaking, the main cause of the absence of network information ethics is the variation of virtual personality. The negative effect of big data technology is the objective condition for its emergence, while the lack of statute institution is the social background for its emergence. Excellent Practice-value reconstruction of modern information ecology ethics must be based on the diversity and differentiation of information ecology, in accordance with the logic of synergy, reciprocity and symbiosis, and in line with the beautiful ideal of promoting the development of human society and information environment, create a harmonious and open environment of fairness and justice in information creation and sharing, and rationally allocate and cultivate more shared information resources, and strive to achieve the balance of information ecosystem. Ultimately promote the sustainable and healthy development of people, information environment and even the material and spiritual life ecology of human society.
The Knife and the Beautiful: Aesthetics and Intelligence in the Game of Go

Abstract Description: This paper examines the function of games and strategy in contemporary AI research and how games influence understandings of intelligence and agency. Crucial to the linkage between games, intelligence, and agency was the emergence of Cybernetics at the end of the second World War, and in particular the thought of Norbert Wiener and John von Neumann. As Peter Galison persuasively argues, Cybernetics and Game Theory alike were animated by an “ontology of the enemy” that relied on the logic of warfare and radical otherness. The present discussion centers on Google's AlphaGo AI, and the Go match played against South Korea’s Lee Sedol in 2016. The match, as depicted in the documentary titled “AlphaGo,” dramatizes the difference between a modern understanding of games as tools for intellectual competition between individuals and a postmodern understanding of games as logical systems for measuring cognitive processes. In order to illuminate this transition in understandings of games, this paper examines the origins of the modern understanding of Go emerging during Japanese modernization, and the early echoes of the AlphaGo match found in the famous 1938 “retirement” match of the last representative of traditional Go houses in Japan as depicted by Kawabata Yasunari. A comparison of these two matches reveals the cultural contingency of the function of games, as well as a concomitant shift in understandings of the human that paralleled a changing understanding of games. Prior to modernization, Go was considered an art form, and Go play was seen as a gradual emergence of meaning between competitors. Kawabata sketches the gradual removal of the game of Go from this rich aesthetic tradition that signaled the loss of Japanese culture. This paper emphasizes the relationship between the human and games in order to explore the implications of East Asian aesthetics for theories of intelligence and agency.
The Logical Basis of Design About New Generation of Intelligent Computer

**Abstract Description**: Intelligent computer is different from traditional computer. A traditional computer is a set of program (which can be called zero-level agent). All of its function have been embedded in pre-programmed procedures, unable to adapt to the situation and temporarily change the strategy. For example, the currently driverless cars listed on the market is also a set of program. After adding the machine learning module to the program, although experience can be summarized afterwards, the external ability of the system can be improved to a certain extent, the learning rules are strictly regulated in advance and cannot act according to circumstances. Intelligent computers are highly anticipated by people, which should be a system with a certain degree of intelligence and dialectical ability to deal with problems with a certain range. Such a computer cannot be built on the rigid logic paradigm; the failure of the fifth-generation computer in Japan has proved that it is impossible to build on fuzzy logic, because fuzzy logic is only a local point of mathematical dialectical logic, it cannot adapt to any situation. The current propositional mathematics dialectical logic can include standard logic, fuzzy logic, probability logic, bounded logic, mutation logic, finite multi-valued logic, continuous-valued logic, lattice-valued logic, cloud logic, deductive reasoning, inductive reasoning, analogical reasoning, hypothesis reasoning, inevitable reasoning, likelihood reasoning, trust reasoning, possible reasoning, monotone reasoning, non-monotone reasoning, coordination logic, transconsistent logic, etc., it can also generate the appropriate logic based on the specific situation. In particular, it is possible to break the barrier between the artificial intelligence of the deep neural network and the artificial intelligence based on knowledge and logic, unifying them and promoting the coordinated development of them.
The relational meaning of information in dynamic processes in reality

Abstract Description: We suggest the framework of a dynamic relation between potentiality and actuality in which the notion of information arises within the perpetual evolutionary process occurring in the reality of existing Being (Dasein). The actual dynamics of events in reality takes place via interaction of individual conceptual units of existence, which we call ontolons. They are relevant to Plato's eidoi or Leibniz' monads and possess a defined internal structure that dynamically reacts to external stimuli and adapts to them. Ontolons are characterized by the fundamental uncertainties in their dynamics (called clinamina by Epicurus) that can be reduced in the course of communication between these entities. In these, the generation of opposites results in their unification into more complex structures and in the destruction of actual structures that do not fit the process as a whole. Meaningful information appears in the network of communicating ontolons as reality in potential form. Different outcomes for the dynamic behavior of a system imply a possibility of their reduction by acquiring the information necessary to reduce the potential field in the most optimal way. Thus, information processes operate in the relational world of communicating individual substances (ontolons) with resulting causal reduction of previous actualities and generation of new potentialities. The nature of information can be summarized by its designation as a dynamic process in reality, whose elements possess the uncertainties that can be reduced in the continuous evolution and generate new uncertainties. The informational constraints of this process correspond to the rules in which logical relations hold between actual and potential states, and continuously generate an emerging included middle state that is fundamentally operational and relational within the total objective dynamic reality. The new rationality of the information concept appearing in Lupasco, Brenner and Wu Kun makes possible a new relationality in the structures of knowledge.
The self in action: Volition in men, mice and machines

Abstract Description: The notion of free will is fundamental for moral responsibility while it is mostly not understood and even questioned as an illusion. In parallel, there is a common concern about future Artificial Intelligence and its applications which assumes artificial volition, raising questions on the realization and control of moral machines. Given this controversial nature of free will, a well-defined theory of this phenomenon is both of great scientific and practical interest. Starting from a well-established theory of mind and brain, called Distributed Adaptive Control (DAC, Verschure, 2016), I will advance a neurobiologically grounded theory of volition, DACv. DACv sees volition as a core process of mind and brain, built from systems for executive control, agency, mind-travel and self. I will provide preliminary data from experiments on intracranially implanted epilepsy patients to support DACv and describe its implementation in an embodied AI system and its current application in neuro-rehabilitation and education. Reference: Verschure, P. F. (2016). Synthetic consciousness: the distributed adaptive control perspective. Philosophical Transactions of the Royal Society B: Biological Sciences, 371(1701), 20150448.
The Singularity Hoax—Why Computers Will Never Be More Intelligent than Humans

Abstract Description: We argue that the dream of the supporters of the technological Singularity, the notion that computers will one day be smarter than their human creators, will never be realized. The notion of intelligence that advocates of the technological singularity promote does not take into account the full dimension of human intelligence. Human intelligence as we will show is not based solely on logical operations and computation, but rather includes a long list of other characteristics that are unique to humans that the supporters of the Singularity ignore. The list includes curiosity, imagination, intuition, emotions, passion, desires, pleasure, aesthetics, joy, purpose, objectives, goals, telos, values, morality, experience, wisdom, judgment, and even humor.
The Third Story: The Poetics of Science and a Metaphysics of Becoming

Abstract Topic: Future of the Global InfoSphere (FGIS)

Author Name: Monica DeRaspe-Bolles

Abstract Description: Western humanity is guided by one of two cosmological stories. The first story is primarily a biblical or spiritual tradition of God creating the universe, setting it in motion, and perhaps acting upon it from time to time from the outside. The second story understands the universe as comprised of bits of inert matter governed by fixed, external laws. Ilya Prigogine and Isabelle Stengers point out that Western thought oscillates between these two stories: a theology in which God governs the universe; and the “world as an automaton.” They note: “In fact these visions are connected. An automaton needs an external god.” (Order Out of Chaos: Man's New Dialogue with Nature, 6-7). The fundamental and pervasive assumption of transcendent and external forces – be they Gods or laws– acting on the natural world from the outside is not only unfounded, but disastrous, leading the human to believe it can manipulate its environment and control the future. What is needed is The Third Story, a story firmly grounded in a metaphysics that holds becoming, not being, as the more fundamental, and far more important, reality. Precedence for an emphasis on time-development and becoming-as-fundamental reality is provided by Ilya Prigogine in the science of complexity and non-linear thermodynamics, with his notion of “dissipative structure;” in the semiotic philosophy of C. S. Peirce; and in the evolutionary cosmology of Teilhard de Chardin. The third story breaks completely with the dualistic epistemological issues that normally arise from the incommensurability of mind and body; reveals a far richer understanding of becoming persons in a dynamic, unified, developing universe; and guides the profound and potentially transformative role of the human as embedded collaborator in the ongoing construction of a new era of Earth.
Thermodynamic Computing

Abstract Description: Concepts from thermodynamics are ubiquitous in computing systems today – e.g. in power supplies and cooling systems, in signal transport losses, in device fabrication and state changes, and in the abstractions and methods in machine learning. In this talk I propose that thermodynamics should be the central, unifying concept in future computing systems. In particular, I suppose that computing systems of the future will thermodynamically evolve in response to electrical and information potential in their environment and that thermodynamic evolution is the unifying idea that addresses the central challenges of energy efficiency and self-organization in technological systems. I present a few results from a novel thermodynamic neural network model that addresses the core assumptions of this approach concretely. Although the talk focuses on the domain of computation, the ideas are generic and derive from simple observations of the everyday world. A key conclusion of the work is that causation is the product of evolution, an idea that inverts the current philosophy of computation and challenges many common assumptions about existence.
Towards Machine Understanding: A Knowledge Supported Learning Approach

Abstract Topic: Global Forum on Artificial Intelligence (GFAI)

Author Name: Hui Wang

Company/Organization: Ulster University

Abstract Description: Big Data characterises today's digital world. Data is being generated in large quantity and velocity and is complex due to variety – from structured (e.g., measurements), semi-structured (e.g., web pages) to unstructured (e.g., text, video). One of the challenges Big Data presents is how to get machines to understand data. If we could understand text, we could summarise it or answer questions. If we could understand video, we could detect events for surveillance purpose. Machine Understanding is a field of study that is aimed at tackling the challenging problem of getting machines to understand data in a modern way, one that utilises recent advances in areas such as computational semantics and ontology, and focuses on common ‘understanding’ operations that can be specialised for different types of data. In this talk, I will present work on knowledge-supported learning as an approach to machine understanding. I will demonstrate a journey from Lattice Machine to Contextual Probability to Neighbourhood Counting Kernel, leading to a new approach to machine learning where learning from data is supported by existing knowledge. I will then present a case study on machine understanding in the context of a project.
TOWARDS ACHIEVING TRANSPARENCY OF AI AS A NORMATIVE GOAL IN SOCIAL MEDIA PLATFORMS

Abstract Description: The growing use of AI in Social media platforms, Jinri Toutiao and Facebook from curating content to connecting people to maximize the reach of the information comes with the potential to be exploited that may distort understanding of information, events and society. There has been a recent resurgence in the quest for openness and transparency of AI in social media and thereby solve many ethical issues generated by AI-based systems. However, it is fair to say that making such explainable artificial intelligence systems that promote transparency of intelligent media experiences is a technical challenge. Transparency desirability relies on improving the people's engagement, preferences, situation and shaping their quest for information. The transparency of AI in social media seems to be dependent on an AI-Transparency matrix that is discussed in this paper. This is done by analyzing the form of AI and its implication on the level of transparency. There are two important consequences of understanding transparency through the matrix; (1) transparency in social media derives its metaphorical authority from the user's technological savviness and the relationship of technology with stakeholders, and (2) transparency's positive and negative connotations are under theorized when referring to creating visibility of information. The study draws out some important findings and discusses ways that these can be used to define transparency of AI in social media, establish its scope, identify practices that suggest a framework on how to achieve transparency. The analysis presented in this paper is part of an on-going research and is designed to be the start for conceptualizing the transparency of media experiences in AI powered social media platforms.

Keywords: Transparency; Explainable AI; Ethics; Social media

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Understanding Man: The Extensions of Digital Media

Abstract Topic: Theoretical Information Studies (TIS)

Author Name: Robert Logan

Company/Organization: U of Toronto

Abstract Description: With digital media not only are media extension of man as McLuhan posited but there is a flip or reversal in which man or the user of digital media becomes an extension of those digital media as these media scoop up our data and use them to the advantage of those that control these media. The implications for this loss of privacy as we become 'an item in a data bank' are explored and the field of captology is described. The feedback of the users of digital media become the feedforward for those media.
Unity of Opposites, Medium, Time and the Existence Question

Abstract Description: The process of human understanding of the world starts from viewing complex chaos, proceeds to monism, the contradiction theory, and finally returns to complexity theory. Starting from the earliest myth, monism had been dominating the ontology. The idea of contradiction is another progress of mankind's understanding of the world, Lao-tzu and Heraclitus put forward their own contradiction theories almost in the same time. In ancient China, the simple contradiction thoughts were already contained in the theory of Yin and Yang and Zhou Yi. In the new information existence theory, the existence and non-existence (You, Wu) can also be roughly interpreted as contradiction relationship. Aristotle mentioned the notion of medium. But the real world cannot be explained by his ideas. Hegel also developed the contradiction theory and a theory of the medium, but his thoughts on medium had many problems. There is still a need for medium between the existence and non-existence (You, Wu), advocated by the new informationism. And the medium is the time. 1. Time is the internal representation of the evolution of existence; 2. The present time belongs to existence, the past and the future time belong to non-existence; 3. Time has a fixed direction, that is the direction of evolution (development of things), evolution cannot be reversed, and time cannot be reversed; 4. The existence of time is absolute, because the evolution of existence is absolute, and no existence can escape from its own evolution process. But at the same time, the speed of time is relative, because the rate of evolution is different, and the rate of evolution is dually influenced by external and internal environments.
What is behind the “I” in the AI? Common delusions and misconceptions demystification.

Abstract Topic: The "I" in AI, and the Meaning in Information

Author Name: Emanuel Diamant

Company/Organization: VIDIA-mant

Abstract Description: The concept of Artificial Intelligence (AI) was introduced about 60 years ago. At the same time, Artificial Neural Networks (ANNs) were devised as a means for AI implementation. They were conceived as a collection of small interconnected computational units (called artificial neurons), which are supposed to imitate the biological neurons of the human brain. Essentially, ANNs were devised as data processing units – 60 years ago, all things in the world were considered computational. But today, the brain is thought as an information processing system. Therefore, biological neurons (and their artificial analogs) should be considered as information-processing units. This shift in the underlying assumptions is overlooked by almost all AI designers. I think it will be nice to find someone, who will be ready to share with me my understanding of these new and challenging issues.
Abstract Description: Humans come from the ocean, and humans will return to the ocean, but the oceans are different, one is an ocean of water, the other an ocean of data. Let us assume: We know the difference between biology and agriculture, but what if we need to establish a new discipline of “computing agriculture”? I give it a name “INFOCULTURE”. Living things can be cultivated, from which humans then can get nutrition in the form of protein or get calories from fat or starchy. Protein is most important to humans. It is helpful in ensuring that human organs work, and energy is useful to keep organs working. The academic discipline and industry is named “Aquaculture” (in water), and “Agriculture” (on land), are different from biology. In the age of AI, the smart robot needs to think by way of software with electricity energy, which keeps accepting external data and produces new data by rational LOGOS. The LOGOS is called “Architecture Model” in the IT industry, the same DNA as in AI robots, the new useful DATA looks like “Nutrition”. Here the name is “Protein Type of Data” (PTD) in INFOCULTURE thinking methodology. From DIKW model, we know Information is useful data, so information is PTD here, enough information with rational thinking can produce knowledge. Humans can produce wisdom through philosophical thinking with knowledge. In big data, we know that it is important to have enough date to analyze, but where to get more data? How to get useful information? INFOCULTURE is the new BIONICS to resolve the problem of how to produce information for AI industry. Data can be cultivated by humans, just like when humans cultivate fish or shrimp. Author: Bo Gao, Shanghai China 0086-13391388169 813466@qq.com East China Normal University & Ocean University of China